No. 8

タイ王国
工業標準化・試験研修センター協力事業
終了時評価報告書

平成6年11月
(1994年11月)

国際協力事業団
鉱工業開発協力部

鉱開協
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タイ王国工業標準化・試験研修センター協力事業終了時評価報告書
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工業標準化・試験研修センター協力事業
終了時評価報告書

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平成 6 年 11 月
(1994年11月)

国際協力事業団
鉱工業開発協力部

国際協力事業団
28046

序　文

タイ王国では、慢性的な貿易収支の赤字を打開することを緊急の課題とし、そのためには、「工業規格および認証制度の普及振興」「工業規格に関する検査を実施する能力の強化」を図り、自国の工業製品の品質を向上させて、国際競争力を強化することによって工業製品の輸出を振興させることが不可欠となりました。

そのような状況から、同国政府は自国において工業規格、認証制度および工業規格に関する検査業務を所管している工業省工業標準局（ＴＩＳＩ）の機能強化のために、日本に対して無償資金協力およびプロジェクト方式技術協力の要請を行いました。

この要請を受けてわが国政府は、プロジェクト方式技術協力については、国際協力事業団（ＪＩＣＡ）を通じて昭和63年４月に事前調査団を派遣し、要請の背景、計画の妥当性、協力の規模などを調査し、平成元年11月から12月にかけて実施協議調査団を派遣して討議議事録（Record of Discussions）の署名を行いました。

本プロジェクトは、同討議議事録に基づき、平成元年12月１日から５年間にわたる技術協力を実施中です。

プロジェクト開始後、約４年６カ月を経過し、協力期間の大半を終了した現時点において、ＪＩＣＡはプロジェクトの進捗状況を確認し、当初計画に対する協力および技術移転達成度についてタイ側関係者と合同で評価を行い、必要があればフォローアップなどの継続的な協力計画を策定することを主な目的として、平成６年６月７日ら６月21日まで終了時評価調査団を派遣しました。

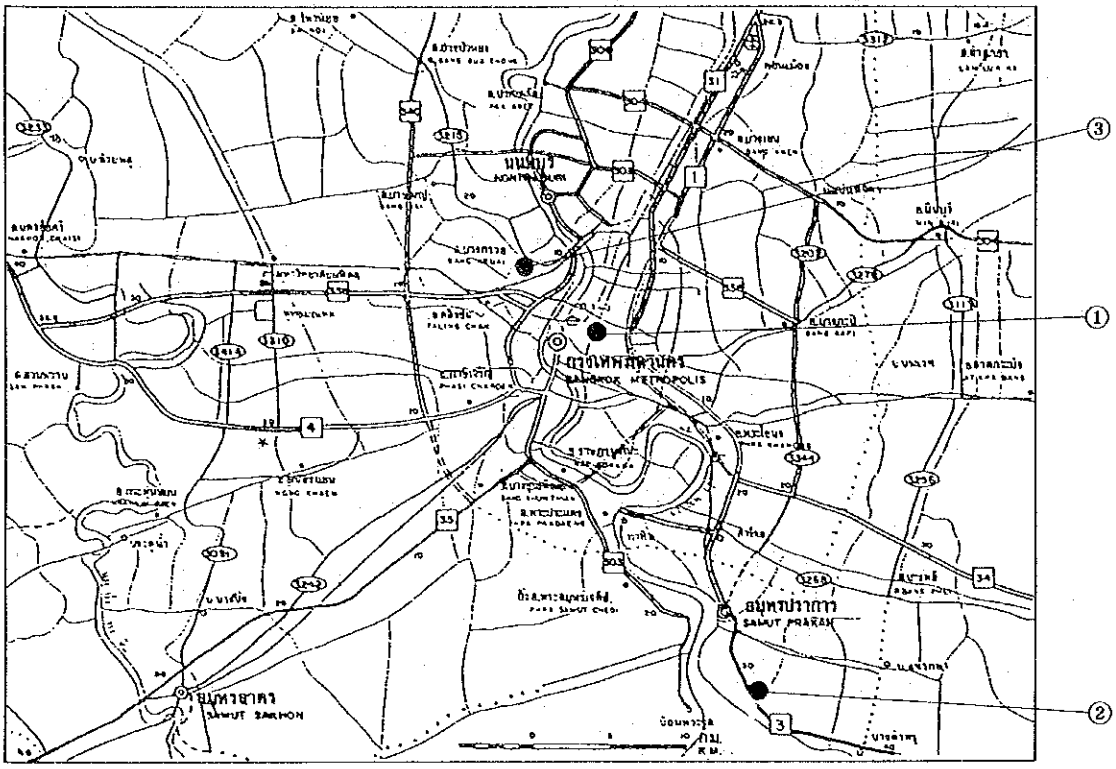
本報告書は同調査団の調査結果を取りまとめたものです。

ここに本調査団の派遣に関し、ご協力いただいた日本・タイ両国の関係各位に対し、心より感謝の意を表するとともに、今後ともご支援をお願いする次第です。

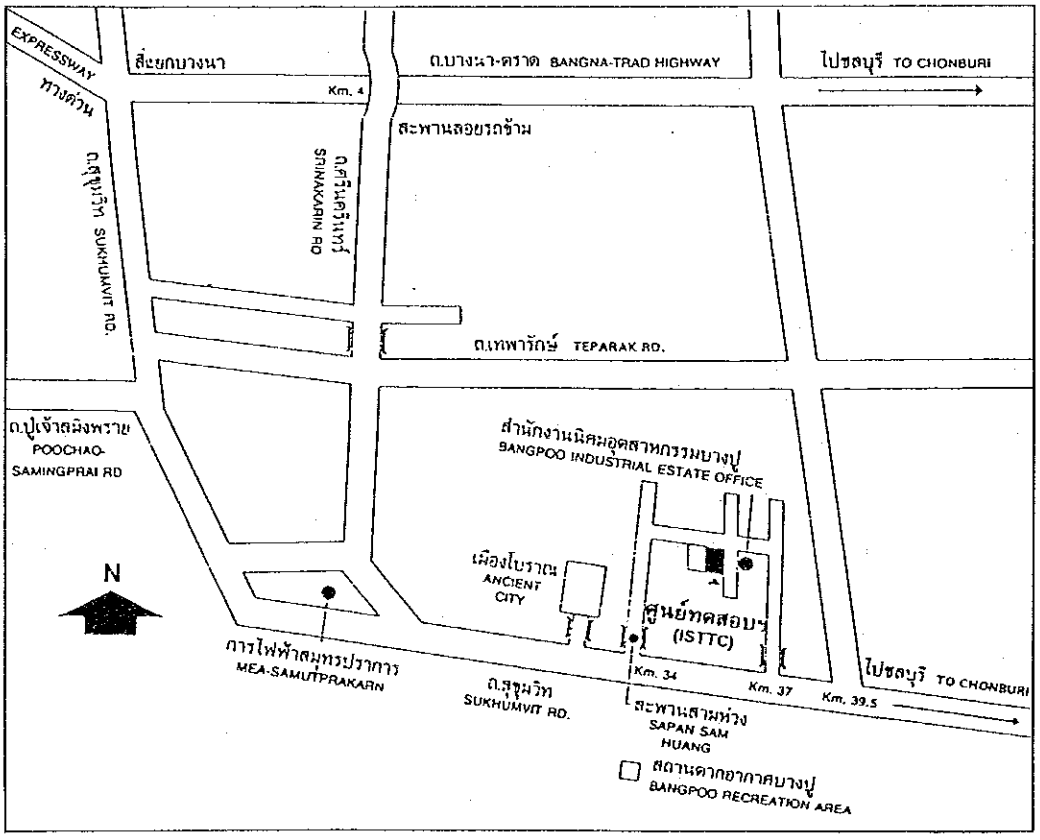
平成６年11月

国際協力事業団
理事　田守栄一

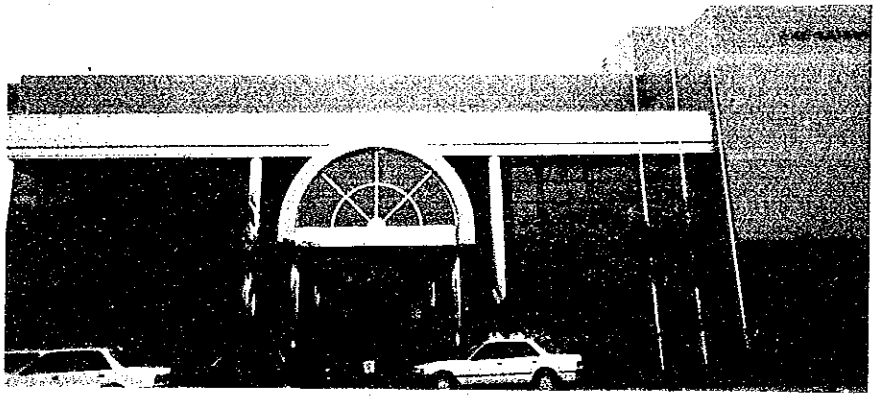
プロジェクト位置図



① TISI (MOI)　② ISTTC (BANGPOO)　③ ISTTC (BANGYIKHAN LAB.)



▲ ミニッツ署名・交換



▲ 工業標準化・試験研修センター

目　　次

序文
プロジェクト位置図
写真

第１章　調査結果の要約 …… 1

第２章　終了時評価調査団派遣 …… 3
2-1　調査団派遣の経緯と目的 …… 3
2-2　調査団の構成 …… 3
2-3　調査日程 …… 4
2-4　主要面談者リスト …… 5
2-5　終了時評価手法 …… 6

第３章　協力実施の経過 …… 8
3-1　相手国の要請内容と背景 …… 8
3-2　暫定実施計画（ＴＳＩ）と実績 …… 8
3-3　他の事業との連係 …… 10

第４章　協力目標達成度 …… 11
4-1　上位計画との整合性 …… 11
4-2　プロジェクト目標の達成度 …… 11
4-3　インプット目標の達成状況 …… 12
4-4　アウトプット目標の達成状況 …… 12

第５章　プロジェクトの波及効果 …… 13
5-1　試験 …… 13
5-2　標準化・品質管理 …… 13

第６章　自立発展の見通し …… 15
6-1　組織的な自立発展の見通し …… 15
6-2　財務的な自立発展の見通し …… 15
6-3　技術的な自立発展の見通し …… 15

第７章　フォローアップの必要性と方法 …… 17

第８章　その他の特記事項 …… 18

第９章　評価結果総括 …… 19

資料

1　評価レポートおよびミニッツ …… 23
2　評価チェックリスト（和文）…… 143
3　ロジカル・フレームワーク（英文・和文）…… 145
4　プロジェクト概要 …… 147

第１章　調査結果の要約

本プロジェクトは1989年12月１日にＲ／Ｄを署名・交換し、５年間の技術協力を開始した。

今回、当初の協力期間の終了を約６カ月後に控えた1994年６月の時点において、日本・タイ合同の評価調査団を組織して、本プロジェクトについて「上位計画との整合性」「プロジェクト目標の達成度」「プロジェクトのアウトプット」「プロジェクトへのインプット」「プロジェクトの効果」「プロジェクトの自立発展性」「フォローアップの必要性」の各項目についての評価を行った。評価結果の概要は、以下のとおりである（資料２、３参照）。

(1)　上位目標、プロジェクト目標

プロジェクト目標は、「工業標準化試験・研修センターが工業標準化、品質管理、試験についての活動を実施するための機能強化・維持を図ること」であり、センターの機能のうち、トレーニングコース、カウンセリングサービスについてはやや不安があるが、全体的にプロジェクト目標の達成度は良好であった。

また、本プロジェクトの上位目標との整合性は良好であるものと推察された。

(2)　プロジェクトのアウトプット

プロジェクトのアウトプットは、「センターの活動に必要な技術がカウンターパートに移転されること」であり、その達成度を①技術移転項目、②試験実施能力、③機器管理能力について評価した。

その結果は、以下のとおりであった。

①　技術移転項目については、Ｒ／Ｄでの計画がほぼ完了した。

②　試験実施能力については、試験実施マニュアルの整備状況についての評価が一応可であったほかは、結果は非常に良好であった。

③　機器管理能力については、機器管理はマニュアルやチェックシートに従って行われており、結果は良好であった。

(3)　プロジェクトへのインプット

日本側インプットは良好であり、タイ側インプットは、カウンターパート配置が一応可であるほかは良好であった。

(4)　プロジェクトの効果

プロジェクトの効果については、試験分野、標準化・品質管理分野ともに、工業省工業標準局（ＴＩＳＩ）内外に受益者が存在し、本プロジェクトによる恩恵を受けていることが確認された。

(5)　プロジェクトの自立発展性

①組織面、②財政面、③技術面においてのプロジェクトの自立発展性を評価の対象とした。

その結果、①組織面について、センターの能力を十分発揮させるためにはカウンターパート数が不十分であるが、現在深刻な問題は起きていないため一応可であり、③技術面についてカウンセリングサービスを実施していく能力にも不安があるほかは、結果はおおむね良好であった。

(6)　結論（フォローアップの必要性）

本プロジェクトはR／Dに記載された内容の技術移転が完了する見込みであり、評価結果もおおむね良好であるため、予定どおり1994年11月30日に終了することとされた。

なお、プロジェクト終了後のセンターの自立発展について、下記の点が確認された。

①　今後の自立発展性のためには、欠員の充足、組織管理および機器管理についてのシステマティックな措置、試験マニュアルの整備が重要なこと

②　本プロジェクトの成果を踏まえ、さらにセンターを発展させるためには、自動車排ガス試験、品質管理などいくつかの分野において、個別専門家派遣、研修員受入などの措置が重要であること

第２章　終了時評価調査団派遣

2-1　調査団派遣の経緯と目的

本プロジェクトは1989年12月１日にＲ／Ｄへの署名を行い協力を開始してから、本調査時点までの約４年６カ月間に、日本側からは①長期専門家12名、短期専門家17名を派遣し、②18名の研修員受入、③1988年から89年までに無償資金協力により供与された機材の機能を補完するための機材を中心にＣ．Ｉ．Ｆ．で約9200万円分の機材の供与を実施した。
一方、タイ王国側からは、①本プロジェクトに対する予算を現在まで総計で11億300万円（プロジェクトサイトのインフラ整備費を含む）確保し、②59名の職員を配置するなどの措置を実施した。

現在、日本・タイ双方の措置およびプロジェクトの活動の結果、プロジェクトの実施体制が確立されているが、本プロジェクトは1994年11月30日に終了するため、今般、評価調査団を派遣することとなった。

本終了時評価調査団の目的は、当初計画に照らし、プロジェクトの活動実績、日本・タイ双方の協力実績、カウンターパートへの技術移転実績についての評価を行うこと、さらに、目標達成度を考慮してプロジェクト終了時までの協力方針についてタイ側と協議することである。

2-2　調査団の構成

担当業務	氏　名	所　属
団長　総括	井上　邦夫	通商産業省　工業技術院 標準部国際規格調整官
団員　技術協力計画	福井　正弘	通商産業省　工業技術院 標準部標準課国際規格室
団員　試験・検査	佐々木隆一	財団法人　日本品質保証機構 常務理事
団員　標準化・品質管理	冨山　和 （コンサルタント）	財団法人　日本規格協会 国際標準化協力センター係長
団員　プロジェクト評価管理	新居田知生	国際協力事業団　鉱工業開発協力部鉱工業開発協力課

2-3　調査日程

1994年6月12日～6月21日（コンサルタントは、6月7日出発）

日順	月　日	曜	行　程	調　査　内　容
1	6／7	火	成田→バンコク （コンサル）	《コンサル出発》 移動（JL717 15:05 着）
2	6／8	水		AM: JICA事務所表敬・打合せ、タイ側調査団員との打合せ PM: TISI職員（研修受講者）へのヒアリング、専門家へのヒアリング
3	6／9	木		資料整理
4	6／10	金		AM: 専門家へのヒアリング PM: ISTTCカウンターパート（サブディビジョン・ヘッド以下）へのヒアリング
5	6／11	土		AM: ISTTCカウンターパート（サブディビジョン・ヘッド以下）へのヒアリング PM: タイ側調査団員との打合せ、ログフレーム（案）作成
6	6／12	日	成田→バンコク （官ベース）	《官ベース出発、コンサル・官ベース合流》 移動（JL717 15:05 着） PM: コンサル・官ベース打合せ
7	6／13	月		AM: JICA事務所表敬・打合せ、大使館表敬 PM: DTEC表敬、TISI表敬 （タイ側調査団との打合せ）
8	6／14	火		AM: ISTTC視察 PM: ISTTCカウンターパート（サブディビジョン・ヘッド以上）へのヒアリング
9	6／15	水		AM: 専門家へのヒアリング PM: 検査依頼者へのヒアリング（TISI 関係部署、民間企業）
10	6／16	木		AM: タイ側調査団との協議 PM: 〃
11	6／17	金		AM: 合同評価報告書（案）およびミニッツ（案）作成 PM: 〃
12	6／18	土		資料整理
13	6／19	日		資料整理
14	6／20	月		AM: 合同委員会（Joint Committee Meeting）合同評価報告書およびミニッツ署名・交換 PM: JICA事務所報告、日本大使館報告、TPA表敬
15	6／21	火	バンコク→成田	移動（TG640 19:00 着）

2-4 主要面談者リスト

TISI

Mr. Chane Boonsong	Secretary General, TISI

THAI EVALUATION TEAM

Mr. Thien Mekanontachai	Inspector-General, MOI(Leader)
Ms. Phani Na Rangsi	Deputy Secretary-General, TISI
Mr. Siri Nandhasri	Specialists, TISTR
Mr. Winlert Bhavabhutanonda	President, TSA
Ms. Pensri Assavachin	Program Officer, DTEC Planning Division
Ms. Prapassorn Udomvaech	Program Officer, DTEC External Cooperation, Division 1

THAI COUNTERPARTS

Mr. Surasak Asavadorudeja	Director, ISTTC, TISI
Mr. Bundit Wothirakchainunt	Head of Testing Sub. Div. 1, ISTTC, TISI
Mr. Panu Chompupong	Head of Testing Sub. Div. 2, ISTTC, TISI
Mr. Wichai Charoenpipatsin	Head of Testing Sub. Div. 3, ISTTC, TISI
Ms. Ratchadatorn Kangvalklai	Head of Testing Sub. Div. 4, ISTTC, TISI
Mr. Punpong Asintthum	Head of Training Sub. Div., ISTTC, TISI
Mr. Anu Peachrun	Head of Administration Sub. Div., ISTTC, TISI
Ms. Kobkun Krittapholchai	Head of Planning & Engineering Sub. Div., ISTTC, TISI

検査依頼者

Mr. Theerayuph Boonpetch	Kingcamp Fiber CO. LTD
Mr. Chalit Homhuel	Head of Standard Div. 1, TISI
Mr. Rampaipan Nakasatis	Head of Standard Div. 2, TISI
Mr. Charoon Leemingsawat	Head of Certification Div., TISI
Mr. Sirilak Boonchaiyo	Head of Surveillance Div., TISI

日本人専門家

曽田　長一郎	チーフアドバイザー
山本　泉	調整員
島田　満治	標準化・品質管理専門家
野口　祐成	機械・材料試験専門家
鬼束　忠人	標準化・品質管理専門家

ＤＴＥＣ

Mr. Nipon Sirivat	Japan Sub. Div., DTEC External Cooperation Division 1

ＴＰＡ

佃　吉一	Advisor

ＪＩＣＡタイ事務所

表　伸一郎	所長
染井　耕一	所員

2-5　終了時評価手法

(1)　評価担当者

日本側　　国際協力事業団終了時評価調査団（構成は、前記「2-2　調査団の構成」のとおり。）

タイ側　　タイ側終了時評価調査団（構成は、以下のとおり）

Mr. Thien Mekanontachai	Inspector-General, MOI(Leader)
Ms. Phani Na Rangsi	Deputy Secretary-General, TISI
Mr. Siri Nandhasri	Specialists, TISTR
Mr. Winlert Bhavabhutanonda	President, TSA
Ms. Pensri Assavachin	Program Officer, DTEC Planning Division
Ms. Prapassorn Udomvaech	Program Officer, DTEC External Cooperation, Division 1

(2)　評価項目

①　プロジェクトへのインプット

②　プロジェクトからのアウトプット

③　プロジェクトの効果

④　プロジェクト目標の達成度

⑤　プロジェクトの上位計画との整合性

⑥　プロジェクトの自立発展の見通し

⑦　フォローアップの必要性

(3)　評価手法

評価を行うにあたっては、以下の資料を参照する。

①　「討議議事録（Ｒ／Ｄ）、暫定実施計画（ＴＳＩ）および年間協力計画（Annual Work Plan)」「討議の覚え書き（Ｍ／Ｄ）」およびプロジェクト実施過程で合意また

は容認されたその他の文書

② 「専門家からの報告書」「アウトプット、インプットなどに関する実績データ」

③ 今回の調査において関係者などに対し行われるヒアリングの結果　など

これらの資料を参照して、上記(2)①～⑦について日本・タイ双方の調査団がそれぞれ団内で評価を行ったのち、双方の結果に基づいて協議を行い、結果を合同評価報告書にまとめる。

（注）ヒアリングは、専門家、ＩＳＴＴＣ職員、ＴＩＳＩ職員、ＩＳＴＴＣへの検査依頼者に対して行う。ヒアリングの結果はチェックリスト、ロジカルフレームワークにまとめる（資料２、３参照）。それらのまとめられた結果に基づいて協議を行い、合同評価報告書を作成する。

第３章　協力実施の経過

3-1　相手国の要請内容と背景

タイ国では、工業化を推進してきたが、そのことが工業原料などの輸入増加を招き、タイ国は慢性的な貿易収支の赤字に悩むこととなった。このような状況を打開するため、タイ国政府は工業製品の輸出振興を図っているが、輸出促進のためには品質向上による製品の国際競争力の強化が不可欠であり、そのために「工業規格および認証制度の普及振興」「工業規格に関する検査を実施する能力の強化」の必要性が強く認識されるようになった。

このような状況から、タイ国政府は自国において工業規格、認証制度および工業規格に関する検査業務を所管している工業省工業標準局（ＴＩＳＩ）の機能の強化のために、日本に対して技術協力を要請してきた。

3-2　暫定実施計画（ＴＳＩ）と実績

プロジェクト開始当初の暫定実施計画（技術協力計画を含む）は次頁のとおりであり、これについては、1992年11月の計画打合せ調査団の折に、

(1)　機械・材料試験の長期専門家の派遣期間をプロジェクト終了まで延長する

(2)　ＱＣマネージャーコースについては、管理者のための品質管理から、ＩＳＯ9000（品質管理のための国際規格）、ＴＱＭ（トータルクオリティーマネジメント）、ＬＡ（規格に関する試験についての公的な認定制度）へ方向性を変える

(3)　カウンセリングサービスについては頻度を減らす

(4)　試験については、インハウス標準化、インハウス校正を内容として含ませる

という変更が加えられた。

また、実績はカウンターパートの数が当初予定より少なかったほかは、おおむね良好であった。

表１に暫定実施計画（ＴＳＩ）を示す。

表１　暫定実施計画（技術協力計画を含む）　（暦年）

	1989	1990	1991	1992	1993	1994	1995
１．プロジェクトの段階							
A．標準	—						
B．実施：基礎の確立		——	——				
発展				——	——	—	
完成						—	
２．タイにおける事項							
A．要請フォームの提出		—	—	—	—	—	
B．人員配置							
総務(チーフアドバイザー、調整員のカウンターパート)			——	——	——	——	- - - -
事務員			——	——	——	——	- - - -
技術専門家のカウンターパート(各専門家について最低2名確保)			——	——	——	——	- - - -
C．開所式の準備		——	——				
D．センターの活動							
スタッフトレーニングコース				——	——	——	- - - -
ＱＣマネージャーコース				——	——	——	- - - -
カウンセリングサービス				——	——	——	- - - -
試験							
電気			——	——	——	——	- - - -
電子			——	——	——	——	- - - -
機械・材料			——	——	——	——	- - - -
化学・材料			——	——	——	——	- - - -
３．日本における事項							
A．調査団の派遣							
B．専門家の派遣							
長期専門家							
チーフアドバイザー							
調整員							
標準化・品質管理							
電気試験							
電子試験							
機械・材料試験							
化学・材料試験							
短期専門家		(必要に応じて派遣)					
C．研修員受入							
運営管理、標準化・品質管理、電気試験、電子試験、機械・材料試験、化学・材料試験		3	4	4	4	3	
		(毎年、３～４名、２～３カ月)					
D．機材供与		——	——	——	——		
		(供与される機材は日本・タイ双方により合意されたもの)					

3-3　他の事業との連係

本プロジェクトでは、その開始に先立って、1988年から1989年にかけて建物と機材が無償資金協力によって供与された。

同協力は、本プロジェクトのセンターと科学技術エネルギー省科学技術エネルギー研究所（ＴＩＳＴＲ）に対して合計約42億4000万円分の供与を行ったが、本プロジェクトのセンターに対しては、そのうちの半分、約20億円分の建物と機材の供与が行われた。

本プロジェクトにおいては、それらの建物、機材が技術移転の実施に大いに利用されている。

第４章　協力目標達成度

4-1　上位計画との整合性

タイ国政府は、かねてから同国工業製品の国際競争力強化による輸出振興および国産品の輸入品に対する競争力の強化を図るための種々の施策を検討してきており、第６次経済社会開発計画（1986-91年）においては、工業の振興、輸出産品の多様化などのために工業標準化の促進、品質管理の普及およびそのための試験能力の強化が重要施策として位置づけられている。同計画を本プロジェクトの上位計画とすれば、本プロジェクトは、タイ国の工業標準化・試験研修センターの工業標準化、品質管理、試験を実施する機能の強化・維持を図るものであり、それらの機能を持つ工業標準化・試験研修センターが今後適切な活動を続ければ、タイ国の工業標準化の促進、品質管理の普及およびそのための試験能力の強化が図られることは、大いに期待されるところである。したがって、上位計画（第６次経済会社開発計画）に対する本プロジェクトの目標設定は、妥当なものであったと考えられる。

4-2　プロジェクト目標の達成度

プロジェクト目標は、「工業標準化・試験研修センターが工業標準化、品質管理、試験についての活動を実施するための機能強化・維持を図ること」である。

そして、センターの機能として、(1)試験、(2)トレーニングコース、(3)カウンセリングサービスについての機能の強化・維持の評価を行った。

(1)　試験

センターの試験能力は、EVALUATION REPORT ANNEX４のActualの欄に示されるように増加傾向にあり、本プロジェクトの活動によって、センターの試験機能が強化されたことが確認される（たとえば、Standards Development、Product Certificate、Surveil-ance、Private Sector の合計で、91年度960件→92年度1495件→93年度2048件）。

(2)　トレーニングコース

トレーニングコースの開催状況は、EVALUATION REPORT ANNEX７のとおりであり、93（平成５）年度には、本プロジェクトにより、ＴＩＳＩに対して２回、民間に対して10回のトレーニングコースが開催された。

特に、ＴＩＳＩに対するトレーニングコースの開催頻度は十分ではないが、ＴＩＳＩでは標準化・品質管理の重要性の認識が浸透してきており、コース受講者を増やすための措置を講じるなどに努めており、その点は評価し得るものである。

(3) カウンセリングサービス

カウンセリングサービスの実施状況は、EVALUATION REPORT ANNEX８のとおりである。

93年度には、本プロジェクトにより、８回の工場でのカウンセリングサービスが実施された。この実施回数は十分ではないが、センターの現在の能力を考えれば評価し得るものと考えられる。

4-3 インプット目標の達成状況

プロジェクトへのインプットについては、日本側は専門家派遣、研修員受入、機材供与、諸経費を評価の対象とし、タイ側はカウンターパート・スタッフ配置、機材調達、インフラ整備、諸経費を評価の対象とした。

(1) 日本側インプット

本評価時までに、長期専門家12名、短期専門家17名が派遣され（EVALUATION REPORT ANNEX15参照）、18名の研修員受入(EVALUATION REPORT ANNEX16参照）、ビードアンシーティング試験器、グローワイヤ試験器などの機材供与(EVALUATION REPORT ANNEX17参照）、５億6594万4000円の経費投入が行われた(EVALUATION REPORT ANNEX18参照）。これらは十分に評価し得るものであった。

(2) タイ側インプット

本評価時までに、２億1252万2020バーツ分の機材調達(EVALUATION REPORT ANNEX22参照）、１億200万バーツ分のインフラ整備(EVALUATION REPORT ANNEX21参照）、2527万8880バーツ分の経費投入が行われ(EVALUATION REPORT ANNEX23参照）、これらは十分に評価し得るものであった。

しかしながら、カウンターパートの配置については、EVALUATION REPORT ANNEX20に記載されるとおり、試験分野40名、標準化・品質管理分野19名である。これは当初の計画と比較しても十分とはいえないことが確認された。

4-4 アウトプット目標の達成状況

プロジェクトのアウトプットは、「センターの活動に必要な技術がカウンターパートに移転されること」であり、その達成度を(1)技術移転項目、(2)試験実施能力、(3)機器管理能力について評価した。

(1) 技術移転項目

技術移転された項目は、EVALUATION REPORT ANNEX11のとおりである。

標準化・品質管理分野については、工場診断技術、ＳＦＩＢ（ＪＩＳの特定外国検査機関としての資格）取得のための申請についての技術を除き、技術移転が完了し、試験

分野については、「プラグーソケット試験」「メカニカルセンサー技術」「自動車電装品試験」以外は技術移転が完了した（なお、ＳＦＩＢおよびこれらの試験分野については、プロジェクト終了までには技術移転が完了する予定である）。

これにより、Ｒ／Ｄに記載された内容の技術移転がほぼ完了したことになる。

(2) 試験実施能力

試験実施能力については、ＴＩＳ規格のうち、現在センターにある機器によって規格適合試験を実施することが可能な強制規格26、任意規格179のうち、強制規格25、任意規格127が完全に実施可能となり、それ以外についても部分的に実施可能となった。

そして、これらの実施可能となった試験技術を活用して、実際に依頼のあった55種類の品目についての試験がセンターの業務として行われた（実施可能となった規格の種類、実際に試験が行われた品目の種類については、EVALUATION REPORT ANNEX 6 参照）。

また、試験能力を維持するために必要なマニュアル類は、機器操作マニュアルについては、248種類の機器のうち231種類が整備されており、整備状況は良好である。試験実施マニュアルについては、上記の規格適合試験のうち整備されているのは49種類だけであり、さらにその整備を続けることが必要であると確認された(EVALUATION REPORT ANNEX12、13参照）。

(3) 機器管理能力

機器管理能力については、機器管理はマニュアルやチェックシートに従って行われており、視察などの結果からみても、現在のところ、カウンターパートは良好な能力を取得していると考えられる。

第５章　プロジェクトの波及効果

プロジェクトの効果については、受益者、内容を試験分野、標準化・品質管理分野についてそれぞれ評価した。

5-1　試験

受益者は、ＴＩＳＩを含む政府機関および民間企業である。効果の内容は、ＴＩＳＩについてはＴＩＳＩが行っている業務（規格開発、規格適合試験、モニタリング）における試験結果の活用、ＴＩＳＩ以外の政府機関については政策への試験結果の活用、民間企業については工場製品の品質の改善（試験を何回も受け、規格に適合した製品を造ることによって製品の品質が改善される）およびＴＩＳマーク制度の普及である。

5-2　標準化・品質管理

受益者は、ＴＩＳＩ本部職員、民間企業である。効果の内容は、ＴＩＳＩについてはＳＦＩＢ取得などのための申請が可能となること、および標準化・品質管理技術の向上であり、民間企業については、ＩＳＯ9000シリーズによる品質システムの習熟である。

第６章　自立発展の見通し

①組織面、②財政面、③技術面においてのプロジェクトの自立発展性を評価の対象とした。

6-1　組織的な自立発展の見通し

センターはＴＩＳＩ内の部署として確立され、管理、予算要求などの点で自立可能である。(EVALUATION REPORT ANNEX19参照）。

ただし、人員配置の点で現在深刻な問題は起きていないが、センターの能力を十分発揮させるためにはカウンターパート数が不十分であり、それに対処するための対策をＴＩＳＩは行う予定である（なお、センター内で実施される排ガス処理関係事業など他の事業が、人員配置の点で本プロジェクトに悪影響を与えないことが確認された）。

したがって、本プロジェクトの組織的な自立発展性は、一応あるものと認められる。

6-2　財務的な自立発展の見通し

センターには、現在も検査業務による収入はあるようである。

協力期間終了後は、政府により高い優先度で保護されることとなっており、それにより必要経費調達が行われることが確認された(EVALUATION REPORT ANNEX23参照）。

したがって、本プロジェクトの財務的な自立発展性は、大いにあるものと認められる。

6-3　技術的な自立発展の見通し

試験技術については、移転された内容（強制規格26、任意規格179の試験技術）は十分満足すべきものであり、その範囲での自立性はあると推察される。ただし技術移転されなかった内容（国際規格、外国の規格についての規格適合試験など）についても今後センターが発展していくためには、何らかの適切な措置が必要であると考えられる。

なお、プロジェクト終了後の機材保守については、タイ側は特別な計画は持っていなかったが、当方より将来的にはセンターおよび機器の管理のために新しく課を作ることを推奨した。

標準化・品質管理技術についても試験技術と同様であり、技術移転された内容については自立性はあると推察された。

しかし、カウンセリングサービス実施能力の点では、カウンターパートの能力は十分とはいえない。

トレーニングコース実施能力については一応良好である。

以上により、本プロジェクトの技術的な自立発展性は、カウンセリングサービスを除きかなりあると認められる。

第７章　フォローアップの必要性と方法

本プロジェクトは、Ｒ／Ｄに記載された内容の技術移転が完了する予定であり、プロジェクト目標の達成状況もおおむね良好であり、終了後の自立性も一応可であると推察されるため、フォローアップの必要性はなく、当初の予定どおり1994年11月30日にプロジェクトを終了することで合意した。

なお、プロジェクト終了後のセンターの自立発展について、①欠員の充足、②組織管理および機器管理についてのシステマティックな措置、③試験実施マニュアルの整備の継続が重要なことが確認された。

また、本プロジェクトの成果を踏まえ、さらにセンターを発展させるためには、自動車排ガス試験、ＴＱＭなどいくつかの分野において、個別専門家派遣、研修員受入などの措置が重要であることが確認された。

第８章　その他の特記事項

(1)　本評価後、プロジェクト終了までに、

①　電気安全性試験、機器校正技術、自動車電装品試験、メカニカルセンサー技術の４分野について短期専門家が派遣されること

②　５名の研修員受入が行われること

③　予算範囲内で機材供与が行われること

が日本側より説明され、タイ側はこれを了解した(M/DのATTACHED DOCUMENT2.1参照)。

(2)　タイ側は将来的な発展のために、1994年日本会計年度以降に以下の個別派遣専門家が派遣されることを要望した(M/DのATTACHED DOCUMENT3参照)。

①　自動車排ガス関連試験技術

②　品質管理およびＴＱＭ(Total Quality Management)

③　家電製品などの安全性（短期専門家１名）

④　非破壊試験（短期専門家１名）

⑤　試験所運営管理（短期専門家１名）

(3)　タイ側は、本プロジェクト終了後、試験所運営管理について個別の研修受入を要望した(M/DのATTACHED DOCUMENT4参照)。

第９章　評価結果総括

(1)　今回の評価の結果を振り返ってみると、技術移転状況、プロジェクト目標の達成度などからみて、本プロジェクトは比較的良好な結果をあげることができたものと考えられる。

(2)　協力期間終了後について考えると、現在も規格に関する試験依頼などが恒常的にあり、センターは今後ともそのための業務を遂行していかなければならないことからみて、本プロジェクトはセンター内において、維持・発展していくものと期待される。

しかし、協力期間終了後も本プロジェクトがさらに発展するためには、今回、タイ側より要望があったように、いくつかの分野においてさらに個別専門家派遣などの支援を行うことが望ましいと考えられる(「第８章　その他の特記事項」の(1)、(2)参照）。

(3)　プロジェクトは、1994年11月30日で終了することとなるが、終了後に万一、技術的な問題が生じた場合には、タイ側の要請に応じてそれに可能な限り対処することが必要であると考えられる。

資　　料

JOINT EVALUATION REPORT
ON
THE JAPANESE TECHNICAL COOPERATION
FOR
THE INDUSTRIAL STANDARDIZATION, TESTING AND TRAINING CENTRE PROJECT IN THE KINGDOM OF THAILAND

JAPAN INTERNATIONAL COOPERATION AGENCY (JICA)
THAI INDUSTRIAL STANDARDS INSTITUTE (TISI)

June 20,th 1994
Thai Industrial standards Institute,
Bangkok, The Kingdom of Thailand

MUTUALLY ATTESTED AND SUBMITTED
TO ALL CONCERNED

JUNE 20th, 1994

BANGKOK THAILAND

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CONTENTS

Page

I. INTRODUCTION 1

1. The Evaluation Teams 1
2. Schedule of the Joint Evaluation 2
3. Attendance 3
   3-1 Japanese side 3
   3-2 Thai side 4

II. METHODOLOGY OF EVALUATION 5

1. Evaluators 5
2. Items for Evaluation 5
3. Methodology of Evaluation 5

III. BACKGROUND AND SUMMARY OF THE PROJECT 6

1. Brief Background of the Project 6
2. Chronological Review of the Project 7
3. Tentative Schedule of Implementation 7

Page

IV. RESULT OF EVALUATION..... 8

1. Objective of the Project..... 8

2. Purpose of the Project..... 9

2-1 Testing for Standards Development..... 9

2-2 Testing for Standards Conformity..... 10

2-3 Testing for Surveillance..... 11

2-4 Testing for Private Sectors..... 11

2-5 Training Courses for TISI Staff..... 12

2-6 Training Courses for Private Sectors..... 12

2-7 Counseling Services..... 13

3. Output from the Project..... 14

3-1 Technology Transfer to Counterpart Personnel in each Planned Field..... 14

3-2 Ability of ISTTC Counterpart Personnel to Perform Testing including Operations of Equipment..... 15

3-3 Ability of ISTTC Counterpart Personnel to Maintain the Equipment..... 17

4. Input by Japanese Side..... 18

4-1 Dispatch of Experts..... 18

4-2 Acceptance of C/Ps for Training in Japan..... 18

4-3 Provision of Machinery and Equipment..... 18

4-4 Expenses..... 18

K.I.

Page

5. Input by Thai side..... 19

5-1 Allocation of C/Ps and Administrative Personnel..... 19

5-2 Procurement of Infrastructure..... 19

5-3 Punchase of Machinery and Equipment..... 19

5-4 Expenses..... 20

6. Impact of the Project..... 20

6-1 Contents of Impact (Standardization & Q.C)..... 20

6-2 Range of Beneficiaries (Standardization & Q.C)..... 20

6-3 Contents of Impact (Testing)..... 21

6-4 Range of Beneficiaries (Testing)..... 21

7. The Prospect of Sustainability..... 22

7-1 From the Organization Aspect..... 22

7-2 From the Financial Aspect..... 23

7-3 From the Technical Aspect of testing..... 24

7-4 From the Technical Aspect of Standardization & Q.C..... 24

7-5 From the Technical Aspect of Counseling activities..... 25

7-6 From the Technical Aspect of Training Courses..... 25

V. CONCLUSION..... 26

LIST OF ANNEXES

Annex 1. Logical Framework

Annex 2. Chronological Review of the Project

Annex 2-1. Japanese Survey Teams Dispatched by JICA

Annex 3. Tentative Schedule of Implementation

Annex 4. Testing Activities

Testing Activities for TISI

Annex 5. Statistics of Certification and Surveillace Division

Annex 6. List of Testing Capability

Annex 7. List of Training Courses

Annex 8. Counceling Service

Annex 9. Schedule of Implementation and Accomplishment

Annex 10. Technical Cooperation Programme

Annex 11. Items of Technology Transfer

Annex 12. Preparation of Operation Manuals

Annex 13. No. of Standards with completed testing procedure manuals

Annex 14. Equipment Operational Capability (Major Equipment List)

Annex 15. Japanese Experts Dispatched by JICA

Annex 16. Counterpart Personnel Trained in Japan

Annex 17. Equipment Provided by JICA

Annex 18. Expenses by the Japanese Side

Annex 19. Organization Structure, TISI and ISTTC

Annex 20. List of Counterparts

Annex 20-1. List of ISTTC Staff

Annex 21. Provision of Infrastructure by the Thai side

Annex 22. Equipment Purchased by the Thai Side

Annex 23. Expenses by the Thai Side

I. INTRODUCTION

1. The Evaluation Teams

The Japanese Evaluation Team (hereinafter referred to as "the Japanese Team") organized by the Japan International Cooperation Agency (hereinafter referred to as "JICA"), headed by Mr.Kunio Inoue, visited the Kingdom of Thailand from 7 June to 21 June 1994 for the purpose of evaluating jointly with the Thai Evaluation Team (hereinafter referred to as "the Thai Team") headed by Mr. Thien Mekanontachai, the achievement of the Japanese Technical Cooperation for the Industrial Standardization, Testing and Training Centre Project (hereinafter referred to as "the Project") on the basis of the Record of Discussions signed on 1 December 1989 (hereinafter referred to as "the R/D").

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

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

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2. Schedule of Joint Evaluation

Date	Schedule
	(Thai Evaluation Team and Consultant)
8 June 1994	A.M. Joint Meeting P.M. Hearing from the counterparts Hearing from an expert
10 June 1994	A.M. Hearing from the experts P.M. Hearing from the counterparts (Heads of subdiv. and staff)
11 June 1994	A.M. Hearing from the counterparts (Heads of subdiv. and staff) P.M. Joint Meeting
	(Japanese Evaluation Team & Thai Evaluation Team)
13 June 1994	P.M. Joint Meeting
14 June 1994	A.M. Observation of ISTTC P.M. Hearing from the counterparts (Director and Heads of subdiv.)
15 June 1994	A.M. Hearing from the experts P.M. Hearing from the applicants for testing
16 June 1994	Joint Meeting
17 June 1994	Drafting of the Joint Evaluation Report and the Minutes of Discussions
20 June 1994	Joint Committee Meeting Signing of the Joint Evaluation Report and the Minutes of Discussions

3. Attendance

3-1 Japanese Side

1) The Japanese Evaluation Team

Mr. Kunio Inoue	Leader
Mr. Masahiro Fukui	Technical Cooperation Planning
Mr. Yawara Tomiyama	Standardization and Certification
Mr. Ryuichi Sasaki	Testing
Mr. Tomoo Niida	Evaluation Planning

2) Japanese Experts

Dr. Choichiro Soda	Chief Advisor
Mr. Izumi Yamamoto	Coordinator
Mr. Mitsuharu Shimada	Standardization and Quality Control
Mr. Yusei Noguchi	Mechanical & Material Testing
Mr. Tadato Onitsuka	Standardization and Quality Control

3) JICA Thailand Office

Mr. Shinichiro Omote	Resident Representative
Mr. Koichi Somei	Assistant Resident Representative

3-2 Thai Side

1) The Thai Evaluation Team

Mr. Thien Mekanontachai	Inspector-General, MOI (Leader)
Mrs.Phani Na Rangsi	Deputy Secretary-General, TISI
Mr. Siri Nandhasri	Specialists, TISTR
Mr. Winlert Bhavabhutanonda	President, TSA
Miss.Pensri Assavachin	Program Officer, DTEC Planning Division
Miss.Prapassorn Udomvaech	Program Officer, DTEC External Cooperation Division 1

2) Thai Counterparts (ISTTC)

Mr. Surasak Asavadorndeja	Director
Mr. Bundit Wothirakchainunt	Head of Testing Sub.Div.1
Mr. Panu Chompupong	Head of Testing Sub.Div.2
Mr. Wichai Charoenpipatsin	Head of Testing Sub.Div.3
Ms. Ratchadatorn Kangvalklai	Head of Testing Sub.Div.4
Mr. Punpong Asintthum	Head of Training Sub.Div.
Mr. Anu Peachrun	Head of Administration Sub.Div.
Mrs.Kobkun Krittapholchai	Head of Planning & Engineering Sub.Div.

II. METHODOLOGY OF EVALUATION

1. Evaluators

   Thai Side : The Thai Evaluation Team

   Japanese Side : The Japanese Evaluation Team

2. Items for Evaluation

   1) Input to the Project

   2) Output from the Project

   3) Impact of the Project

   4) Purpose of the Project

   5) Objective of the Project

   6) Prospect of Sustainability

   7) Necessity of the Follow-up Activities

3. Methodology of Evaluation

   1) In order to evaluate the past implementation and achievement, the following materials were used:

      1. Record of Discussions, Tentative Schedule of Implementation, Annual Work Plan, Minutes of Discussions & Other documents agreed on or accepted in the course of implementation of the Project.

      2. The Logical Framework (Annex 1)

      3. Data of Input to the Project and Output from the Project

      4. Results of the Hearings

   2) Both teams discussed and studied together regarding the items in the Section 2 above.

      Through careful studies and discussions, the results were summarized into the Joint Evaluation Report.

III. BACKGROUND AND SUMMARY OF THE PROJECT

1. Brief Background of the Project

The Thai Government has been devoting itself to change its economic structure into an industrialized country. However, the negative effect, such as a chronic trade deficit due to increasing import of industrial materials and parts has revealed.

In order to overcome this situation, the Thai Government has put its effort to promote exports of the Thai industrial products.

With a view to successfully facilitating the exports, strengthening the international competitiveness of the Thai products by way of improvement of quality is inevitable. Based on this, recognition that it is necessary to "promote industrial standardization and certification system" and to" strengthen technical competence for carrying out testing and inspection related to Thai Industrial Standards" has intensified.

Under such circumstances, the Thai Government requested Japan to provide a technical cooperation to the Industrial Standardization, Testing and Training Center (ISTTC)/TISI/MOI which was established by the Grant Aid of the Government of Japan, to efficiently perform its functions concerning industrial standardization, quality control and standards related testing.

The Project commenced on Dec. 1st 1989, scheduled to last five years, thus the term for the Project will terminate on the Nov. 30th this year 1994.

2. Chronological Review of the Project

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

3. Tentative Schedule of Implementation

The initial Tentative Schedule of Implementation (TSI) is as shown in Annex 3.

IV. RESULT OF EVALUATION

1. Objective of the Project

The Project aims at improvement of Thai national standards and certification system through the enforcement of ISTTC capability. The contribution of the Project to the objective in the field of testing, and standardization and quality control are as follows:

1) Testing

TISI manages totality of national standards (TIS) and certification system in Thailand. The Project promotes ISTTC testing activities and 80% of the testing is entrusted by TISI (Annex 6). The Project assists the promotion activities of Thai national standards and certification system through these testing activities and is contributing to improvement of Thai national standards and certification system.

2) Standardization and quality control

The Project also aims at technology transfer in the field of standardization and quality control, intending to educate and train personnels in this field through the activities, and is contributing for improvement of national standards and certification system.

2. Purpose of the Project

The purpose of the Project is as follows :

To strengthen the functions of ISTTC, and to secure the sustainability of the ISTTC in carrying out the adequate industrial standardization, quality control and testing activities.

The followings were used for the evaluation of the achievement of the purpose above as the verifiable indicators :

1) Testing for Standards Development (Annex 4)
2) Testing for Standards Conformity (Annex 4) (Annex 5)
3) Testing for Surveillance (Annex 4) (Annex 5)
4) Testing requested by private sectors (Annex 4) (Annex 6)
5) Training courses for TISI staff (Annex 7)
6) Training courses for private sectors (Annex 7)
7) Counseling survices (Annex 8)

* Note: The year indicated in each Annex is expressed according to the Thai fiscal year (TFY).

2-1 Testing for Standards Development

Testing for standards development is a test entrusted to ISTTC by Standards Divisions of TISI in order to reflect the product testing data adequately to their TIS development activities.

According to the data gathered from the begining of the Project, from Dec. 1989 to Sep. 1993, the total number of 228 sets of testing for standards development were carried out in ISTTC. This figure is expected to increase. Especially in 1993 TFY, the number of testing exceeded double of it in the previous year. Besides the factor such as integration of Bangyikhan Laboratory (for construction materials and food) the increase of the number of testing shows the fact that ISTTC has surely expanded its testing capability and TISI Headquarters highly evaluates ISTTC's technical competence for testing.

2-2 Testing for Standards Conformity

Testing for standards conformity is a test entrusted to ISTTC by Certification Division of TISI in order to check standard conformity of the products concerned, with a view to grant licence to the factory put TIS Mark on their products.

According to the data gathered from the beginning of the Project, from Dec. 1989 to Sep. 1993, the total of 2,302 sets of testing for standards conformity were carried out in ISTTC. This figure is also expected to increase. In 1993 TFY, the total number of 796 sets were performed against the target value of 590 sets. Considering the present technical competence of ISTTC, this value is sufficient to evaluate.

The decrease in the number of testing in 1992 TFY from the previous year is due to composition of the 1991 TFY figure, which includes testing related to TISI Surveillance Division established in 1992 TFY.

2-3 Testing for Surveillance

Testing for surveillance is a test ertrusted to ISTTC by TISI Surveillance Division in order to confirm quality of the products concerned with a view to perform the surveillance of the factories which have been permitted to put TIS Mark on their products.

TISI Surveillance Division is a division newly set up in 1992 TFY, thus actual number of testing entrusted by this Division to ISTTC is a figure of 1992 TFY (494 sets) and 1993 TFY (679 sets).

Considering the present technical competence of ISTTC, this value is also sufficient to evaluate.

2-4 Testing Requested by Private Sectors

In 1993 TFY, ISTTC performed total number of 436 sets of the requested testing by private sectors, this figure highly exceeded the target value of 325 sets. (Annex 4)

According to Annex 6, ISTTC has the capacity capable for 55 categories of the requested testing. This figure is also sufficient to evaluate.

2-5 Training Courses for TISI Staff

According to the data, 2 (two) kinds of training courses for TISI staff including ISTTC staff were performed in 1993 TFY, whose themes were:

1) Testing Laboratory Accreditation (2 days)
2) TQC in Industry (2 days)

This value is not sufficient to evaluate, however, TISI has gradually put its attention to penetrating TQM philosophy into TISI staff. And actually in 1994 TFY, training courses on TQM have been conducted to the TISI specially allotted staff by a Japanese expert.

Furthermore, TISI intends to spread the range of participants to all TISI staff, which is to be fully appeciated.

2-6 Training Courses for Private Sectors

According to the data, ten (10) training courses for private sectors were performed in 1993 TFY mainly by ISTTC counterpart personnel.

The main contents of training courses were:

1) Interpretation of standards including safety approach
2) Methods of test
3) ISO 9000 series

The results are to be appreciated as ISTTC made maximum effort within its ability.

2-7 Counseling Service

In testng activities, the following counseling services to the clients should be indispensable before accepting request for testing concerning both testing based on the relevant standards and based on the requests for product development and confirmation of product characteristics:

1) Setting up test condition
2) Confirming test procedures
3) Other necessary technical arrangements

According to the results of hearing, ISTTC's counseling services in 1993 TFY were as follows :

1) Technical guidance at ISTTC : 204
2) Technical consultation at the sites : 8
3) Other several inquiries through telephone

It should be noted that although ISTTC does not satisfactorily perform its functions of the counseling services such as TQM related technical guidance to the factories due to the limitation of manpower and technical knowledge, ISTTC should be highly appreciated for its making maximum effort within its technical competence.

3. Output from the Project

3-1 Technology Transfer to Counterpart Personnel in each Planned Field

The followings are used for the evaluation of the achievement of the technology transfer to counterpart personnel as the verifiable indicators:

1) Schedule of Implementation and Accomplishment (Annex 9)
2) Technical Cooperation Programme (Annex 10)
3) Items of Technology Transfer (Annex 11)

3-1-1 Technology Transfer in Standardization and Quality Control

Although technology transfer have been completed, those concerning Factory Instruction and preparation for SFIB application have yet been performed partially.

Technology transfer concerning SFIB will be completed by the scheduled termination period of the Project.

Concerning total quality management, further technology transfer will be needed.

3-1-2 Technology Transfer in Testing Field

Technology transfer in the testing field planned in the R/D was almost completed except for the following items:

1) Plug and Socket Test
2) Mechanical Sensor Technology
3) Automobile Electric Equipment and Parts Test

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Technology transfer for the remainings will be carried out by dispatching short term experts and training counterpart personnel in Japan during the cooperation period of the Project.

3-2 Ability of ISTTC Counterpart Personnel to Perform Testing including Operations of Equipment

The following are used for the evaluation of the ability of ISTTC counterpart personnel to perform testing as the varifiable indicators:

1) List of Testing Capability (Annex 6)
2) Preparation of Operation Manuals (Annex 12)
3) Number of Standards with Completed Testing Procedure Manuals (Annex 13)

3-2-1 Testing Ability for Compulsory Standards

Compulsory standards being able to be tested by counterparts personnel using the testing equipment installed in ISTTC are counted to be 26, among which 25 are capable for testing completely.

The above figure shows that ISTTC is doing its possible largest efforts within the present manpower, and we should highly evaluate it.

3-2-2 Testing Ability for Voluntary Standards

Volumtary standards being able to be tested using the present testing equipment are counted to be 179, among which 127 are capable for testing completely.

Efforts are continuously being made to expand the capable test, and we can highly evaluate the efforts.

3-2-3 Testing Ability for Requested Testing

As to the testing requested from organizations other than TISI, 55 categories of testing are accepted and implemented (Annex 6). This shows ISTTC's expansion of ability of complying with many fields of requested testing, and we can highly evaluate it, considering the present limitation of manpower.

3-2-4 Number of Operation Manuals

Operation Manuals are indispensable to operate main equipment. At present 231 operation manuals in Thai and/or English are available in ISTTC. It shows that ISTTC engineers can operate existing equipment adequately. (Annex 12)

3-2-5 Number of Standards with Complete Testing Manuals

In testing based on standards and other regulations, it is indispensable to prepare testing manuals commonly used for testing engineers in order to get testing data with the possible smallest scattering.

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The target number in prepaing testing manual (procedure) depends on the way of drawing up manuals, required level of tests and average technical level of testing engineers, so that the determination of the number is difficult in general.

As a result of hearing from counterpart personnel and checking some testing manuals made in ISTTC, it can be concluded that ISTTC already has forty nine (49) testing manuals. Manuals in electrical, electronics, and chemical testing field are almost completely drawn up.

As to the machanical and metallic material test field, however, emphasis is put on mastering the operation of a lot of testing equipment. There is a limitation in the number of testing personnel and in time affordable for preparing manuals. Considerable efforts will be further neccessary for completion of manual drawing up.

3-3 Equipment Maintenance Capability (Annex 14)

Although maintenance of the equipment seems to be good for the time being, it is recommended to set up a new subdivision exclusively in charge of technical management of the laboratory and the equipment it possesses. Activities of the new subdivision should be diverse, such as repair of the equipment, periodical comfirmation of the precision of the equipment and drawing up the specification of adequate testing equipment, implementation of the equipment control and provision of all neccessary records according to ISO/IEC Guide 25 etc.

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4. Input by Japanese Side

4-1 Dispatch of Experts

Japanese side has dispatched twelve (12) long-term experts and seventeen (17) short-term experts in relation with the Project as shown in Annex 15.

4-2 Acceptance of Counterpart Personnel for Training in Japan

JICA has accepted eighteen (18) Thai counterpart personnel in sixteen (16) fields for training in Japan as shown in Annex 16.

4-3 Provision of Machinery and Equipment

Up to now, the machinery, equipment and materials e.g. bead unseating testing machine, shaping machine and glow wire testing apparatus have been provided by the Government of Japan through the Project as shown in Annex 17.

4-4 Expenses by the Japanese Side

The total outlay of the Project by the Japanese side was 565,944,000 Yen as shown in Annex 18.

5. Input by the Thai Side

5-1 Allocation of Thai Counterpart and Administrative Personnel

As shown in the organization chart of the ISTTC in Annex 19, Thai side has allocated the counterparts to learn technology from both long-term and short-term Japanese experts. Allocation of counterpart personnel (Annex 20) has not been sufficiently achieved. Main reasons are as follows:

1) Since the establishment of the ISTTC in the first three years, the ISTTC has faced the problem in recruiting technical staff due to the rapid growth of industry.
2) Thai government has a policy to freeze the increase of civil servants. Each government agency can increase personnel not more than 2% per year. However, this policy does not cover any new projects. Based on the concept of new projects, TISI will make a request to waive the freezing policy for the ISTTC Project as well as for the Vehicles Emission Control and the Electro Magnetic Compatibility projects under which the laboratories are being constructed.

5-2 Provision of Infrastructure

The provision of infrastructure by the Thai side is as shown in Annex 21.

5-3 Purchase of Machinery and Equipment

The machinery and equipment with the total cost of 212,522,020 Baht have been purchased by the Thai side as shown in Annex 22.

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5-4 Expenses

The total outlay of the Project by the Thai side was 25,278,880 Baht as shown in Annex 23.

6. Impact of the Project

As to the contents of impact and the range of beneficiaries, both teams have confirmed the results of hearing shown as follows:

6-1 Contents of Impact (Standardization and QC)

1) Preparation for the application of SFIB and AIA for JIS marking system at TISI
2) Study of the newly established certification system which adapts the new concept of the ISO 9000 and JIS marking system through the enhancement of QC concept at TISI.
3) Standardization and QC technology of TISI staff has been enhanced through the Japanese experts technology transfer.

6-2 Range of Beneficiaries (Standardization and QC)

1) TISI Headquarters
2) Needs for counseling service is prospected to be increased in the private sectors.

6-3 Contents of Impact (Testing)

This item is confirmed by hearing and the result of it is shown as below:

1) Eighty (80) percent of the ISTTC activities are related to TISI's job.
   1. Testing for Standard development (Annex 4)
   2. Testing for Standard conformity (Annex 4)
   3. Testing for Surveillance (Annex 4)
2) Testing cooperation with other government offices concerned, e.g. cooperation with EGAT (The Electricity Generating Authority of Thailand) to promote save energy policy.
3) Promotion of TIS marking system through the testing services for the factories in which QC mind has been promoted gradually.(Annex 5)
4) Maintaining the quality at the factory through the testing services for TIS.

6-4 Range of Beneficiaries (Testing)

Private sector related to TIS (shown in the Annex 5) as well as the government sector including TISI.

7. Prospect of Sustainability

7-1 From the Organizational Aspect

1) As shown in the organization chart of TISI, ISTTC has firmly been positioned as a division within TISI (Annex 19), and has a high possibility in making independent administrative decision and flexibility in comparison with other divisions in TISI. ISTTC will have sufficient resources and capability to secure budget for the future programmes.
2) The ISTTC has the staff with affluent management ability, thereby, structure necessary for management and implementation of the future programmes has been established basically. However, systematic approach to laboratory management and maintenance of testing equipment should be required.
3) In accordance with the restructuring of TISI in 1993, the ISTTC has obtained staff from construction materials subdivision and food subdivision of Bangyeekan, and is now comprised of 52 members.
4) Concerning staff allocation, although no serious problem to manage ISTTC has appeared at present, it is considered that the number of staff is still not sufficient to make full use of ISTTC functions. Though it is the policy of Thai Government to freeze civil servants TISI will try to waive the freezing policy for the ISTTC Project and to support ISTTC by transfer staff from other Divisions to ISTTC. Since there is a concern of retainability of the staff within ISTTC who underwent technology transfer programme, TISI is considering to take some countermeasures to prevent such individual movement including setting up a foundation to support welfare of staff and expect to give bonus.
5) Development of new TIS standards, by using the test results from ISTTC is increasing. ISTTC is expected to be fully utilized, therefore more equipment is required so that ISTTC can serve TISI efficiently in this area.

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6) From 1993, along with development of standards related to restraints on exhausted gas of automobiles, implementation of new testing facility is progressing. This trend will expand ISTTC's involvement in the future activities and will not make any negative impact to the Project regarding staff allocation.

7-2 From the Financial Aspect

1) As ISTTC is a formal entity in the organization structure of TISI, it will be financially supported by the Budget Bureau in high priority after the period of cooperation (Annex 23) when compared with other Division in TISI and in Ministry of Industry. During 1993-1996, more than 300 million Baht has been allocated to ISTTC to set up Vehicles Emission Control Laboratory and in 1995-1996 more than 200 million Baht will be allocated to set up the Electro Magnetic Compatibility Laboratory.
2) It is recognized that budget allocation is indispensable when the replacement of machinary and equipment gets to be neccessary.
3) ISTTC will cooperated with other agencies in research and development work in some fields, e.g. cooperation with EGAT to investigate energy saving of electrical appliance.

23

7-3 From the Technical Aspect of Testing

Actual results of the test are conducted based on TIS compulsory standards (26) and many TIS voluntary products standards (179) and the testing ability is satisfactory in the consideration of the experience of the testing engineers.

However, the number of the engineers and the ability should be increased to cope with the testing demand of the manufacturers to have the products tested based on foreign standards, international standards (ISO and IEC standards) and for manufacturers' standards prepared for the quality control or research and development of the products.

Increase of the number and quality of the testing engineers should be emphasized for improvement of the efficiency of certain number of the testing facilities and for obtaining the international reputation for the testing reliability. The proper way of the maintenance and development of the ISTTC activities is to be able to conduct various testing that will be increased in the volume and the technical level by the rapid growth of industry. In this regards, ISTTC still needs technology transfer.

7-4 From the Technical Aspect of Standardization and Quality Control

It considered that counterpart personnel can make use of standardization methods as sufficient number of technologies of standardization were transfered. However, counterpart personnel do not have enough abilities to cope with items which were not transfered.

7-5 From the Technical Aspect of Counseling Activities

Counseling activities of ISTTC are not sufficient results for the more capacity of the engineers is applied to the testing activities.

The demand of the counseling service will be increased by increasing a number and scope of the standards and advance of the testing technology, and ISTTC should be in compliance with the demand for development of the testing activities.

7-6 From the Technical Aspect of Training Courses

Establishment and the enhancement of the training courses on testing technology are very effective strategy to develop the testing technology and to diffuse the knowledge of the necessity of the product testing.

At present, ISTTC takes much effort to make the training course with fairly satisfactory results. However, the established courses depend on the ability of ISTTC engineers, not on the demand from the concerned manufacturers, that condition should be changed to comply with the manufacturers demand.

In the near future, TISI will fully train not only TISI staff but also private sectors and expect to expand the training activity to be international. ISTTC should make effort to increase the engineer ability and to prepare its proper training materials.

25

V. Conclusion

As a result of the Joint Evaluation work and discussions, both Teams reached the following conclusion :

1. According to the evaluation result, the technology transfer in the Project has been successfully implemented in general and it was reflected to the activities of ISTTC. Both Teams agreed that sustainable development of ISTTC is possible within the scope of technology transfer.

   Both Teams also noted that the following are important measures for the sustainability of ISTTC.

   1) Fulfill the number of staff vacancy
   2) Systematic approach of laboratory management and maintenance of testing equipment
   3) Continuation of testing manual preparation

2. As to the future prospect of ISTTC activities, both Teams recognized the importance of further development of testing, counseling and training activities in ISTTC, especially in response to the newly raised needs and the higher technology.

   In this connection, TISI expressed the strong desire of dispatch of JICA individual experts in the following fields.

   1) Expert (s) in the field of automobile emission technology
   2) Expert (s) in the field of Quality Control and Total Quality Management

26

3) One (1) short term expert in electrical field particularly for safety of household and similar electrical appliances (IEC 335-1)

4) One (1) short term expert in NDT (non-destructive test by using Eddy Current and Magnetic Particle)

5) One (1) short term expert in laboratory management for good practice

And TISI also expressed the strong desire of the acceptance of Thai personnels to be trained in Japan in the field of the Laboratory Administration and Management.

3. In conclusion, as mentioned in 1 above both Teams agreed that the technology transfer would be completed as planned in the R/D and the Project should be terminated on November 30, 1994 as scheduled in the R/D. However, for the ISTTC's future sustainability and further development, the requests expressed by Thai side as mentioned in 2 above shall be well considered.

27

LOGICAL FRAMEWORK

Technical Cooperation for the Project on the Industrial Standardization, Testing and Training Centre (ISTTC) of Thailand

Summary of the Project	Verifiable Indicators	Evaluation Results	Pre-conditions (Important assumptions)
Objective of the Project (indirect impact) Contribute to the quality improvement of Thai industrial products through promotion of the national standardization and certification system.	The degree of contribution of the ISTTC activities to the objective of the Project.		Thai Government' continuous recognition of the importance of industrial standardization and certification system.
Purpose of the Project (direct impact) To strengthen the functions of the ISTTC and to secure the sustainability of the ISTTC in carrying out the adequate industrial standardization, quality control and testing activities.	Inquiry about the ISTTC activities: (1) Testing relating to standards development (requested by the Standards Div.) (2) Testing relating to standard conformity (requested by the Certification Div.) (3) Testing relating to surveillance (requested by the Surveillance Div.) (4) Testing requested by private sectors (5) Training courses for TISI staff (6) Training courses for private sectors (7) Counseling services	December, 1989 ~ September, 1993 '91 / '92 / '93 / Total (1) No. of testing 37 / 54 / 137 / 228 (2) No. of testing 811 / 695 / 796 / 2,302 (3) No. of testing - / 494 / 679 / 1,173 (4) No. of testing 112 / 252 / 436 / 800 (5) No. of courses 2 courses ('93) (6) No. of courses 10 courses ('93) (7) No. of services 8 factories ('93)	·Maintain the status of ISTTC within the organization structure of TISI/MOI. ·Keep connection and cooperation with other parties concerned.
Output from the Project To transfer required technology to the counterpart personnel to perform the ISTTC activities.	(1) Technology transfer to counterpart personnel in each planned field (2) Ability of ISTTC counterpart personnel to perform testing including operations of the equipment (3) Ability of ISTTC counterpart personnel to maintain the equipment	(1) Technical transfer planned in the R/D was almost completed. (2) Testing technologies for the planned compulsory standards were almost mastered, and are becoming available for the voluntary standards. Preparation of operation manuals is almost completed and preparation of testing manuals should be continued. (3) Maintenance of the equipment were performed in accordance with the prepared manuals and/or check sheets.	·Encourage the counterpart personnel, who acquired technical transfer from Japanese experts, to remain in ISTTC. ·Necessary budget is allocated. ·Requests for testing and training are continuously supplied to ISTTC. ·TISI uses ISTTC testing facilities on the top priority.
Activities 1. Industrial Standardization and Quality Control ·Training courses for TISI staff ·Training courses for private sectors ·Technical counseling services for private sectors 2. Testing concerning Standards ·Standards conformity testing ·Standards development testing ·Surveillance testing ·Testing requested from private sectors ·Comments on industrial standards Maintenance of Facility and Equipment ·Preparation and arrangement of various manuals	Input by the Japanese Side (December, 1989~ March, 1994) (1) Dispatch of the Japanese experts : Long-term Experts 12 Short-term Experts 17 (2) Acceptance of the Thai counterpart personnel for training in Japan : 18 counterpart personnel (16 fields) (3) Provision of the equipment : Bead unseating testing machine, Shaping machine, Glow-wire testing apparatus Ventilation system/Fume cupboard, etc. (4) Expenses : ¥ 565,944,000 Input by the Thai Side (December, 1989 ~ September, 1994) (1) Allocation of the Thai counterpart and administrative personnel: 59 persons (ISTTC 40, TISI 19) (2) Procurement of the equipment : 212,522,020 Baht (approximately corresponds to ¥ 850 million) (3) Adjustment of infrastructure concerned : 13,284,500 Baht (approximately corresponds to ¥ 53 million) (4) Expenses: 49,792,840 Baht (approximately corresponds to ¥ 200 million)		·Fulfill the necessary number of counterpart personnel in ISTTC. ·Necessary equipment and spare parts are available. ·Testing samples for test are continuously supplied. Prerequisites Promotion of TIS Marking Certification system and strengthening of the national capability of the standards conformity testing have been strongly desired in order to ensure quality improvement of Thai industrial products.

Annex 2

CHRONOLOGICAL REVIEW OF THE PROJECT

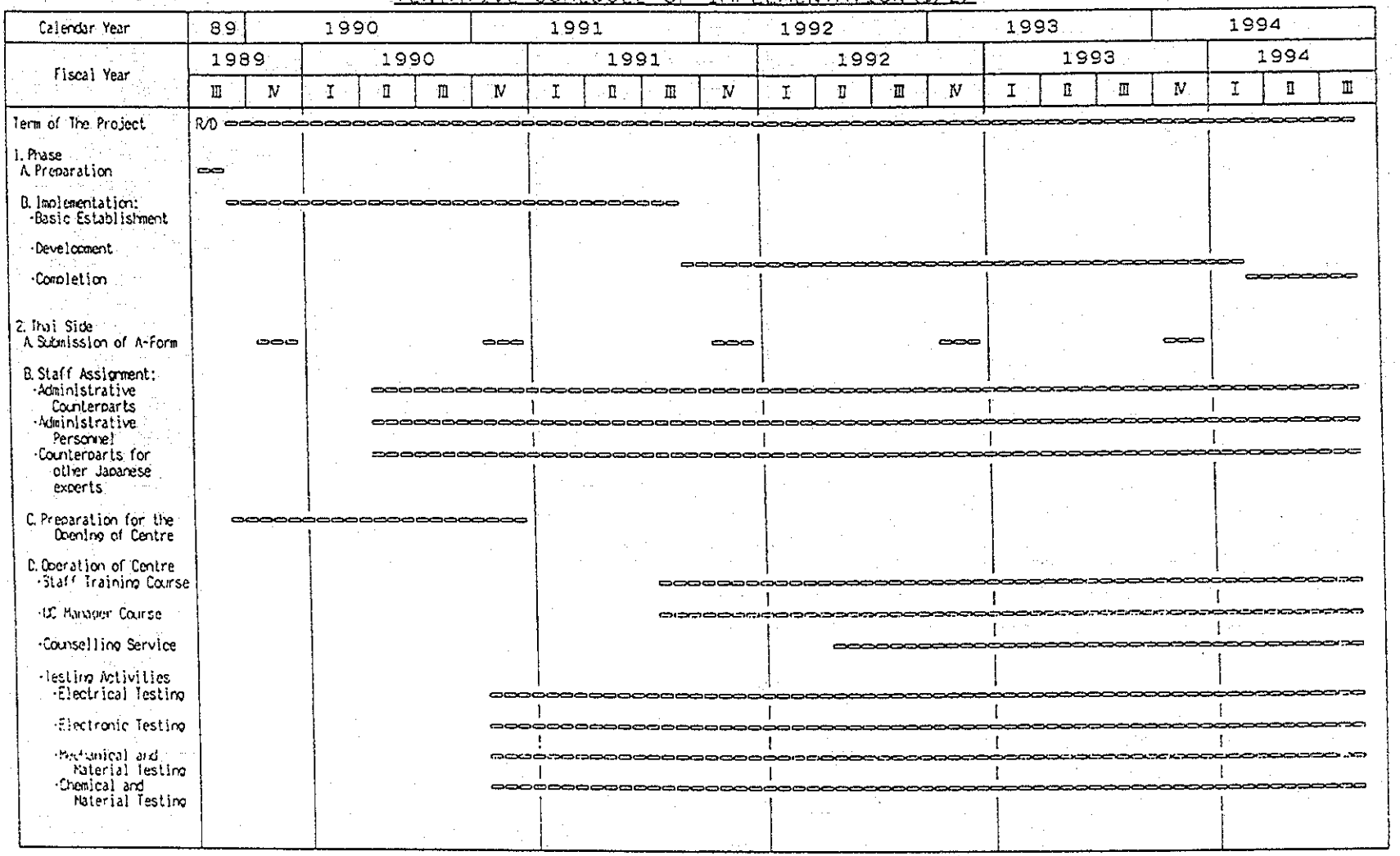
Year	Month	Item
1987	Dec.	The Government of Thailand requested to the Government of Japan for both Grant Aid and Technical Cooperation.
	Dec.	Dispatch of the Preliminary Study Team for Grant Aid and the Contact Team for Technical Cooperation by JICA
1988	Apr.	Dispatch of the Preliminary Survey Team for Technical Cooperation
	Jul.	Cabinet Resolution for Establishment of the ISTTC
	Nov.	Exchange of Notes for Grant Aid for Phase I Project
1989	Apr.	Approval for Commencement of Operations of the ISTTC
	Apr.	Commencement of the Building Construction for Grant Aid
	Jul.	Exchange of Notes for Grant Aid for Phase II Project
	Aug.	Dispatch of the Experts Survey Team for Technical Cooperation
	Dec.	Dispatch of the Implementation Survey Team and sign of the Record of Discussions (R/D) for Technical Cooperation
1990	Mar.	Training of the First Batch of the Thai Counterpart Personnel in Japan
	Mar.	Completion of the Building Construction and Commencement of Equipment Installation for Grant Aid
	Jun.	Dispatch of the First Batch of the Long-term Experts.
	Nov.	Handing-over of the Grant Aid Project
	Dec.	The Expert Team and the Counterpart Personnel moved to the Project Site in the Bangpoo Industrial Estate from TISI.
1991	Mar.	Grand Opening Ceremony of the ISTTC
	Apr.	Dispatch of the Consultation Team
	May	Commencement of Testing Services to TISI and Other Agencies
1992	Mar.	Dispatch of the Technical Guidance Team
	Nov.	Dispatch of the Consultation Team
1993	Oct.	Dispatch of the Technical Guidance Team
1994	Jun.	Dispatch of the Evaluation Team

JAPANESE SURVEY TEAMS DISPACHED BY JICA

1. Contact Survey Team (6)	Dec.16,1987 - Dec.25,1987
2. Preliminary Survey Team (5)	Apr. 5,1988 - Apr.12,1988
3. Experts Survey Team (4)	Aug. 8,1989 - Aug.26,1989
4. Implementation Survey Team (5)	Nov.27,1989 - Dec. 3,1989
5. Consultation Team (5)	Apr. 3,1991 - Apr.11,1991
6. Technical Guidance Team (5)	Mar. 8,1992 - Mar.15,1992
7. Consultation Team (5)	Nov.15,1992 - Nov.22,1992
8. Technical Guidance Team (5)	Oct.24,1993 - Oct.30,1993
9. Evaluation Team (5)	June 7,1994 - June21,1994

Annex 3

TENTATIVE SCHEDULE OF IMPLEMENTATION (1/2)



Annex 3

TENTATIVE SCHEDULE OF IMPLEMENTATION (2/2)

Calendar Year	'89		1990				1991				1992				1993				1994		
Fiscal Year	1989		1990				1991				1992				1993				1994		
	III	IV	I	II	III	IV	I	II	III	IV	I	II	III	IV	I	II	III	IV	I	II	III
Term of the Project	R/D																				
3. Japanese Side A. Despatch of Mission																					
B. Despatch of Experts ·Long-term Experts: ·Chief Advisor																					
·Coordinator																					
·Standardization & Quality Control																					
·Electrical Testing																					
·Electronic Testing																					
·Mechanical and Material Testing																					
·Chemical and Material Testing																					
·Short-term Experts: (To be considered when the necessity arises)																					
C. Thai Counterparts Training in Japan ·Field of Training: ·Management & Administration																					
·Standardization & Quality Control																					
·Electrical Testing		(3)				(4)				(4)				(4)				(3)			
·Electronic Testing																					
·Mechanical and Material Testing																					
·Chemical and Material Testing																					
D. Provision of Supplementary Equipment																					

TESTING ACTIVITIES

Unit : set

Testing for \ Year (TFY)		1991	1992	1993	1994
1. Standards Development	Target	-	151	70	55
	Actual	37	54	137	(55)
	%	-	35.8	195.7	100.0
2. Product Certification	Target	-	603	590	440
	Actual	811	695	796	(212)
	%	-	115.3	134.9	48.2
3. Surveillance	Target	-	763	550	620
	Actual	-	494	679	(195)
	%	-	64.7	123.5	31.5
4. Private Sectors	Target	-	296	325	325
	Actual	112	252	436	(45)
	%	-	85.1	134.2	13.8
Total	Target	-	1,813	1,535	1,440
	Actual	960	1,495	2,048	(507)
	%	-	82.5	133.4	35.2

Note ( ) : 1st period (Oct.93-Jan.94)

Testing Activities for TISI 1993

TISI ＼ ISTTC	Subdiv.1	Subdiv.2	Subdiv.3	Subdiv.4	Total No.of set of sample
Standards Division	0.0%	37.9%	45.8%	16.3%	137
Certification Division	30.0%	24.6%	31.4%	14.0%	796
Surveillance Division	9.1%	38.5%	36.1%	16.3%	679

Annex 5

STATISTICS OF CERTIFICATION AND SURVEILLANCE DIVISIONS 1991-1993

Item / TFY	Unit	2534 (1991)	2535 (1992)	2536 (1993)
No.of Licence	Licence	1015	1365	1197
No.of Licencee	Factory	397	502	510
Total No. of Sample (Certification Div.)	Sample	2289	3110	2883
Total No. of Sample (Surveillance Div.)	Sample	2287	2243	2309
No.of Sample request for ISTTC. (Surveillance Div.)	Sample	447	526	739

Annex 6
June.1,1994

LIST OF TESTING CAPABILITY

I. COMPULSORY STANDARDS (1/9)

No.	TIS No.		Capability
1	4-1986	Incandescent lamps	C
2	10-1986	Low-voltage distribution link fuses	C
3	11-1988	PVC-insulated cables and flexible cords	C
4	17-1989	Polyvinyl chloride pipes for drinking water service	C
5	20-1984	Steel bars for reinforced concrete : round bars	C
6	23-1978	Ballast for fluorescent lamps	C
7	24-1984	Steel bars for reinforced concrete : deform bars	C
8	27-1985	Liquefied petroleum gas containers	C
9	51-1987	Canned pineapple	C
10	52-1973	Tapioca product	C
11	53-1985	Safety matches	C
12	183-1985	Starters for fluorescent lamps	C
13	196-1976	Automobile safety glasses: laminated safety glass	C
14	197-1978	Autumobile safety glasses : tempered glass	C
15	198-1976	Automobile safety glasses : zone tempered safety glass	C
16	211-1984	Steel bars for reinforced concrete : rerolled round bars	C
17	293-1979	PVC-insulated aluminium cables	C
18	330-1980	Hard Tapioca pellet	C
19	344-1987	Lampholders for tubular fluorescent lamps and starterholders	C
20	366-1985	Electric iron	C
21	369-1981	Protective helmets for road users	C
22	370-1981	Liquefied petroleum gas cylinder for internal combustion engines	C
23	870-1989	Electric stoves : open type heating elements : safety requirements	C
24	934-1990	AC Electric fans : safety requirements	C
25	950-1990	Solid alcohol fuel	P
26	956-1990	Fluorescent lamps : safety requirements	C

Note C : complete test P : partial test

II. Voluntary standards

No.	TIS No.		Capability
1	3-1983	Local fish sauce	C
2	6-1981	Automotive lead-acid storage batteries	C
3	12-1986	Asbestos-cement flat sheets	C
4	13-1987	Sulphuric acid for use in lead-acid batteries	C
5	18-1986	Asbestos- cement corrugated sheets	C
6	19-1971	Water for storage batteries	C
7	32-1985	Ceramic ware in contact with food : permissible limits and method of test for lead and cadmium	C
8	37-1986	Floor tiles	P
9	38-1983	Mosaic tile	P
10	41-1973	Sulphuric acid and oleum for industrial use	C
11	43-1973	Canned baby corn	C
12	50-1973	Galvanized steel sheet	C
13	57-1987	Hollow load-bearing concrete masonry units	C
14	58-1987	Hollow non-load-bearing concrete masonry units	C
15	59-1973	Concrete building brick	C
16	63-1974	Filling cabinet	P
17	67-1974	Canned longans	C
18	71-1974	Galvanized wire	P
19	72-1984	Canned peas	C
20	73-1974	Canned straw mushroom	C
21	77-1974	Building bricks	C
22	79-1986	Asbestos cement asymmetrical section coorugated sheet	C
23	83-1984	Vinegar	C
24	91-1974	Edible common salt	C
25	92-1987	AC electric table type fans	P
26	93-1989	Leaf springs for automobiles and trailers	C
27	95-1982	Steel wire for prestressed concrete	P
28	97-1974	Brake lining for automobiles	C
29	98-1974	Canned sweet corn : cream style	C
30	99-1974	Orange juice	C
31	100-1974	Tomato juice	C

K.I. Note C : complete test P : partial test

No.	TIS No.		Capability
32	105-1974	Carbon dioxide : Solid	C
33	107-1974	Hollow steel sections for general structural purposes	C
34	112-1974	Pineapple juice	C
35	116-1986	Structural steel sections	C
36	118-1974	Low voltage cables for automobiles	P
37	116-1986	Structural steel section	P
38	118-1979	Low voltage cables for automobiles	P
39	127-1987	AC electric pedestal type fans	C
40	128-1985	Precast reinforced concrete drainage pipe	C
41	131-1975	Rubber slippers	C
42	132-1985	Canvas shoes	C
43	136-1975	Canned rambutans	C
44	138-1975	Binding wires	P
45	146-1988	V-belt for power transmission	P
46	150-1975	Sodium hydroxide for industrial use	C
47	153-1975	Structural clay non-load-bearing screen tiles	C
48	163-1975	Annealed iron wires	P
49	167-1976	Calcium silicate face bricks or sand-lime bricks	C
50	168-1976	Facing bricks	C
51	178-1988	Plywood	C
52	187-1986	Fruit squashes	C
53	192-1976	Wooden flush door	C
54	194-1976	Ordinary wires	P
55	200-1976	Clips, paper wire	C
56	205-1987	AC electric ceiling type fans	P
57	213-1977	Ready-mixed concrete	C
58	216-1977	Rigid PVC Couduit for electrical wiring and telephone cable	P
59	217-1977	Hydrochloric acid for industrial use	C
60	219-1977	Gypsum plasterboards	C
61	224-1977	Non-reinforced concrete drain pipes	C
62	225-1990	Hypochlorite	C

Note C : complete test P : partial test

No.	TIS No.		Capability
63	236-1990	Fluorescent lamps	C
64	246-1977	Canned tomatoes	C
65	258-1978	Plain washer	C
66	276-1978	Steel pipes	P
67	277-1989	Galvanized steel pipes	P
68	282-1978	Canned corned beef	C
69	288-1978	Palm oil	C
70	297-1979	Black pepper and white pepper	C
71	305-1979	Canned tomato concentrates	C
72	315-1979	Pre-cooked reic porridge	C
73	340-1985	Exhaust system for car, bus and truck	C
74	341-1985	Motorcycle exhaust muffler	C
75	345-1980	Office steel card cabinets	C
76	348-1989	Low carbonsteel wire rods	C
77	349-1980	High carbon steel wire rods	C
78	353-1989	Office steel storage cabinets	C
79	367-1986	Automobile tyres	P
80	368-1981	Industrial protective helmets	P
81	372-1981	Canned rambutan stuffed with pineapple	C
82	378-1988	Concrete flooring tiles	C
83	385-1981	Room air conditioners	P
84	396-1981	Prestressed concrete piles	C
85	398-1981	Prestressed spun concrete piles	C
86	404-1982	Galvanized steel wire strands	P
87	425-1982	Frozen pineapple	C
88	427-1982	Electrically welded steel water pipe	P
89	428-1982	Forzen cuttlefish, squid and octopus	C
90	445-1982	Hollow concrete blocks for concrete composite floors	C
100	462-1983	Dehydrated soups	C
101	463-1983	Sorbitol solution	C
102	464-1983	Citric acid	C

Note C : complete test P : partial test

No.	TIS No.		Capability
103	492-1983	Canned tropical fruit cocktail or canned fruit salad	C
104	514-1984	Steelwire ropes	P
105	523-1984	Leather safety footwear	C
106	524-1984	Melamine utensils	C
107	530-1984	Formaldehyde solution (formalin)	C
108	535-1984	Concrete roofing tile	C
109	571-1985	Bicycle tyres	C
110	572-1985	AC electric double-oscillating type fans	P
111	576-1988	Precast concrete slabs for concrete floors systems	C
112	585-1985	Green coffee	C
113	613-1986	Glazed ceramic tiles for internal walls	P
114	614-1986	Ceramic tiles for external walls	P
115	616-1986	Frozen fish fillets	C
116	617-1986	Frozen whole fish	C
117	641-1986	Sesame	C
118	651-1986	Tube for automobile tyres	C
119	652-1989	Bicycle rubber inner tubes	C
120	655-1986	Plastics utensils for food	C
121	658-1986	Rubber hose for coolant system	P
122	682-1987	Motorcycle tyres	C
123	685-1987	Toys	C
124	687-1987	Automotive lamps	P
125	697-1987	Weather strips for automobile	P
126	701-1987	Chip or cracker	C
127	716-1987	Staples	C
128	721-1987	Seat belt for automobiles	P
129	737-1987	Welded steel wire fabric for concrete reinforcement	P
130	738-1987	Fresh whole milk	C
131	742-1987	Biscuits	C
132	747-1988	Cold-drawn steel wire for concrete reinforcement	P

Note C : complete test P : partial test

No.	TIS No.		Capability
133	752-1988	Dried chrysanthemum flowers	C
134	759-1988	Hinges for doors and windows : butt hinges	C
135	770-1988	Zinc coated steel conduits for electrical wiring	P
136	773-1988	Artificial flowers	C
137	778-1988	Frame sets for adjustable louvre window	C
138	791-1988	Vitreous china sanitary appliances : wash basins	P
139	792-1988	Vitreous china sanitary appliances : water closet bowls	P
140	793-1988	Vitreous china sanitary appliances : flushing cisterns and covers	P
141	794-1988	Vitreous china sanitary appliances : squatting water-closet pans	P
142	795-1988	Vitreous china sanitary appliances : urinals	P
143	800-1988	Door weater strips for automobiles	P
144	809-1988	Rubber boots	C
145	811-1988	Automotive V-belts	P
146	816-1988	Polyethylene resin	P
147	826-1988	Cement mortar flooring tiles	C
148	827-1988	Interlocking concrete paving blocks	C
149	828-1988	Precast concrete elements for composite floor system	C
150	840-1989	Curry powder	C
151	848-1989	Ham	C
152	862-1989	Window hinges : friction hinges	C
153	885-1989	AC supplied electronic ballasts for tubular fluorescent lamps : safety requirements	P
154	897-1989	Hydrogenperoxide for industrial use	P
155	910-1989	Polybutylene (PB) pressure pipe and tubing for drinking water services	P
156	914-1989	Kunchiang (chinese sausages)	C
157	919-1989	Dried/dehydrated fruit	C
158	921-1990	Table-tennis tables	C
159	940-1989	Football	C

Note C : complete test P : partial test

No.	TIS No.		Capability
160	941-1989	Basketball	C
161	942-1989	Volleyball	C
162	950-1990	Solid alcohol fuel	C
163	952-1990	Duplicating ink	P
164	955-1990	Rubber insulated copper cables : braided cords	P
165	957-1990	Zinc ingots	C
166	965-1990	Glasses for use in building : tempered glass	P
167	971-1990	Prestressed concrete fence posts	C
168	989-1990	Stainless Steel water tanks	C
169	1008-1990	Precooked macaroni	C
170	1009-1990	Beef ball pork ball and chicken ball	C
171	1013-1990	PVC door	P
172	1028-1991	Mixed flour for deep-fry	C
173	1039-1990	Electric rice cookers	P
174	1089-1991	Flavoured crispy peas and beans	C
175	1103-1992	Potassium chlorate	C
176	1112-1992	Zinc sulphate for industrial use	C
177	1128-1992	Roofing steel sheets	P
178	1155-1993	Air-cooled split-type room air conditioners	P
179	1160-1993	Trimethoprim	P

Note C : complete test P : partial test

III. REQUESTED TESTING (8/9)

1. Thermal insulators
2. Rigid PVC conduct for electrical wiring and telephone cables
3. Electrical switchgear
4. Chrismastree light
5. Resistor producing machine
6. Stator coil
7. Core type Loudspeakers
8. Electric pot
9. Solid tyre for fork-lift
10. Tractor-blade
11. Bronze-knife
12. Weather strips for automobile
13. VHF/FM mobile radio
14. Ball of ball valve
15. Room lamp for automobile
16. Steel grit G-40
17. Pallet conveyor and rail
18. Room lamp assembly
19. Galvanized steel sheet
20. Die
21. Motorcycle battery
22. Oil tank for automobiles,
23. Plastic strips for refrigerator
24. Strength of metallic material
25. Strength of non-metallic material
26. Hardness of metallic material
27. Microstructure
28. Impact test
29. Salt Spray
30. Radiographic test
31. Ozone test
32. Industrial effluent
33. Bronze ware : knives
34. Bronze ware : spoon
35. Sodium hexameta phosphate
36. Magnesium chloride
37. Blade for trackter
38. Cast iron

39. Bronze ingots
40. Copper pipe
41. Raw water
42. Nickel sulphate coating solution
43. Waste water
44. Manganese
45. Stainless steel
46. White cast iron
47. Graphite cast iron
48. Steel for container making
49. Zeolite
50. Stamp pad
51. Activated Clay
52. Floor Polish : semisolid
53. Copper Residue
54. Copper Sulphate
55. Steel plate

TRAINING ACTIVITIES

Unit : time

Year	Target	Actual
1991	-	1
1992	10	12
1993	12	12
1994	15	(2)

Note ( ) : 1st period (Oct.93-Jan.94)

LIST OF TRAINING COURSES

No	DATE/VENUE	MAIN THEME	SUB THEME	LECTURER	ATTENDANCE
1.	19,25 July and 7,9,16 Aug 1991/ISTTC	INTRODUCTION TO QC 7 TOOLS	1.Seven Tools of Quality Control -Pareto Diagram -Cause & Effect Diagram -Scatter Diagram -Graph -Check Sheet -Histogram -Control Chart 2.Some of QC Philosophy 3.John-Harris's Window 4.PDCA Cycles 5. 1st Step to QC (Standardization) 6.QCC Activities with Hot Hearts	JICA experts -Mr.Watanabe -Mr.Kubo Countorparts (C/P) -Mr.Punpong -Mr.Vinai -Mrs.Kobkun	30 persons (ISTTC Staffs)
2	21-22 Nov 1991/ISTTC	STANDARDS FOR THE MECHANICAL TESTING OF INDUSTRIAL PRODUCTS AND PRECISION EQUIPMENT(1st) [COOPERATED with TPA]	1.General Concept of Industrial Standards 2.Standard Laboratory & Standard Procedure of Testing 3.Basic Theory of Mechanical Tests and Precision Equipment 4.Demonstration & Practice	ISTTC Staffs -Mr.Udom -Mr.Thammachai -Mr.Pranot -Mr.Punpong (C/P)	22 persons (Private Sector)
3	3-4 Dec. 1991/ISTTC	STANDARDS FOR THE MECHANICAL TESTING OF INDUSTRIAL PRODUCTS AND PRECISION EQUIPMENT(2nd) [COOPERATED with TPA]	1.General Concept of Industrial Standards 2.Standard Laboratory & Standard Procedure of Testing 3.Basic Theory of Mechanical Tests and Precision Equipment 4.Demonstration & Practice	ISTTC Staffs -Mr.Udom -Mr.Thammachai -Mr.Pranot -Mr.Punpong (C/P)	20 persons (Private Sector)

No.	DATE/VENUE	MAIN THEME	SUB THEME	LECTURER	ATTENDANCE
4	14-15 Jan. 1992/TISI	STATISTICAL METHODS FOR QUALITY IMPROVEMENT	1.Seven Tools of Quality Control 2 Some of QC Philosophy 3 Statistics Simulator "Beads Test" Using 4.Sampling by Random Die 5.Case Study of Sampling Inspection & Exercises	JICA Experts Mr.Watanabe Mr.Kubo	40 persons (TISI Staffs)
5	26 Mar. 1992/ISTTC	INTRODUCTION TO LABORATORY ACCREDITATION	1.Scope and Objective 2.General Requirements for The Acceptance of Testing Laboratories 3.General Requirement for The Technical Competence of Testing Laboratories	TISI Staffs Mr.Virat Mr.Ni-touch	25 persons (ISTTC Staffs)
6	28-29 Apr. 1992/ ISTTC	STANDARDS FOR THE MECHANICAL TESTING OF INDUSTRIAL PRODUCTS AND PRECISION EQUIPMENT(3rd) [COOPERATED with TPA]	1.General Concept of Industrial Standards 2.Standard Laboratory & Standard Procedure of Testing 3.Basic Theory of Mechanical Tests and Precision Equipment 4.Demonstration & Practice	ISTTC Staffs -Mr.Udom -Mr.Thammachai -Mr.Pranot -Mrs.Kobkun (C/P)	22 persons (Private Sector)
7	24-25 Jun 1992/ISTTC	STANDARDS AND BASIC SAFETY TEST FOR ELECTRIC PRODUCTS (1st) [COOPERATED with TPA]	1.General Concept of Industrial Standards 2.Foreign Safety Standards 3 Standard Laboratory & Standard Procedure of Testing 4.Basic Theory of Safety Tests 5.Demonstration & Practice	ISTTC Staffs -Mr.Thammachai -Mr.Yongyud -Mr.Pitak -Mr.Narat -Mr.Theera	22 persons (Private Sector)
8	2-3 July 1992/ISTTC	STANDARDS FOR THE MECHANICAL TESTING OF INDUSTRIAL PRODUCTS AND PRECISION EQUIPMENT(4th) [COOPERATED with TPA]	1.General Concept of Industrial Standards 2 Standard Laboratory & Standard Procedure of Testing 3.Basic Theory of Mechanical Tests and Precision Equipment 4.Demonstration & Practice	ISTTC Staffs -Mr.Chana -Mr.Thammachai -Mr.Pranot -Mr.Vinai (C/P)	22 persons (Private Sector)

No	DATE/VENUE	MAIN THEME	SUB THEME	LECTURER	ATTENDANCE
9	13-14 Aug 1992/ISTTC	NON-DESTRUCTIVE EXAMINATION TECHNIQUES FOR INDUSTRIAL PRODUCT'S QUALITY(1st) [COOPERATED with TPA]	1.Overview of NDE 2.Radiography Technique 3.Ultrasonics Principle Instruments Technique 4 Eddy Current Principle Instruments Technique 5.Magnetic Particle Technique 6 Liquid Penetrant Technique 7.Practice & Try out with Instruments	CHULALONGKORN UNIVERSITY -Mr.Pichai -Mr.Chatchai -Mr.Chairot ISTTC Staffs -Mr.Udomsak -Mrs.Samerji	18 persons (Private Sector)
10.	20-21 Aug 1992/TISI	QUALITY ASSURANCE AND SAMPLING INSPECTION	1.The Principle and Objective of Quality Assurance and Sampling Inspection 2 Acceptance of Inspection by Data and Histograms 3.OC Curve 4.The Quality Assurance and Sampling Inspection of Thai Honda Manufacturing Co.,Ltd. 5.The Quality Assurance and Sampling Inspection of Ajinomoto Co.,(THAILAND) Ltd.	1.Mr.WATANABE (JICA Expert) 2.Mr.KUBO (JICA Expert) 3.Mr.MOROOKA QC Manager , Thai Honda Manufacturing Co.,Ltd. 4.Mr.Keisuke NAGAI Manager of Technical Center , Ajinomoto Co.,(THAILAND) Ltd. 5.Mr.PITAKI Interpreter) (ISTTC Staff)	25 persons. (TISI Staff)
11	23-24 Sep 1992/ ISTTC	STANDARDS FOR THE MECHANICAL TESTING OF INDUSTRIAL PRODUCTS AND PRECISION EQUIPMENT(5th) [COOPERATED with TPA]	1.General Concept of Industrial Standards 2.Standard Laboratory & Standard Procedure of Testing 3.Basic Theory of Mechanical Tests and Precision Equipment 4.Demonstration & Practice	ISTTC Staffs -Mr.Chana -Mr.Thammachai -Mr.Pranot -Mr.Vinai (C/P)	24 persons (Private Sector)

No	DATE/VENUE	MAIN THEME	SUB THEME	LECTURER	ATTENDANCE
12	13-14 Oct. 1992/ ISTTC	STANDARDS AND BASIC SAFETY TEST FOR ELECTRIC PRODUCTS (2nd) [COOPERATED with TPA]	1.General Concept of Industrial Standards 2.Foreign Safety Standards 3.Standard Laboratory & Standard Procedure of Testing 4.Basic Theory of Safety Tests 5.Demonstration & Practice	ISTTC Staffs -Mr.Vinai (C/P) -Mr.Udom -Mr.Bandit -Mr.Narat	20 persons (Private Sector)
13	4 May 1992/ISTTC	PROFIT MAKING THROUGH QUALITY [COOPERATED with TPA]	1.What is TQC .? 2.Profitability of TQC 3.Quality Concepts 4.Management Concepts 5.Administrative System for QC Promotion 6.Quality & Economy -Profit Making Through Quality -Quality & Cost -Quality & Sales 7.Discussion	-Dr.Noriaki KANO Professor of Management Science,Faculty of Engineering, Science University of Tokyo (SUT) -Dr.Parithat (Interpreter)	45 persons (Private Sector)
14	30 Jul. 1992/ISTTC	JIS FORUM (THAILAND & JAPAN) [COOPERATED with TPA]	1.Presentation of Experience's YOKOHAMA RUBBER Co.,Ltd. on Standardization and Quality Control & Discussion 2.ISTTC's Laboratory Study Tour 3.Works visit (Factory Tour) of Bangpoo Industrial Estate -Sunstar Eng. Co.,Ltd. -Kobe Mig Wire Co.,Ltd.	Mr.Takayoshi TANIMURA (Manager,MB Quality Assurance Dept. ,The Yokohama Rubber Co., Ltd.)	42 persons (JIS Forum (Thailand) 27 Persons & JIS Forum (Tokyo) 15 persons)

No.	DATE/VENUE	MAIN THEME	SUB THEME	LECTURER	ATTENDANCE
15	11-12 Mar 1993/ ISTTC	TESTING LABORATORY ACCREDITATION	1 Scope and Objective 2.General Requirements for The Acceptance of Testing Laboratories 3.General Requirement for The Technical Competence of Testing Laboratories 4.How to Write Quality Manual	TISI Staffs 1.Mrs.Prima 2.Mrs.Saowanee	30 persons (ISTTC Staffs)
16	22-23 Apr. 1993/ ISTTC	STANDARDIZATION AND TESTING · STANDARDS FOR A C. ELECTRIC FANS(SAFETY REQUIREMENT) (1st) [SAFETY STANDARDS]	1.General Concept of Industrial Standards 2.Standard Laboratories & Standard Procedure of Testing 3.Standards for A.C.Electric Fans (Principle & Techniques) 4 Testing Demonstration & Practice	ISTTC Staffs 1.Mr.Udom 2.Mrs.Kobkun (C/P) 3.Mr.Narat	26 persons (Private Sector)
17	13-14 May 1993/ ISTTC	STANDARDS FOR THE MECHANICAL TESTING OF INDUSTRIAL PRODUCTS AND PRECISION EQUIPMENT(6th) [COOPERATED with TPA]	1.General Concept of Industrial Standards 2.Standard Laboratory & Standard Procedure of Testing 3.Basic Theory of Mechaniccal Tests and Precision Equipment 4.Demonstration & Practice	ISTTC Staffs -Mr.Vinai (C/P) -Mr.Pranot -Mr.Chana	23 persons (Private Sector)
18	22-23 Jun 1993/TISI	TQC IN INDUSTRY	1.Basic Concept of Japan Quality Control 2.Main Columns for Quality Control -Policy Control -Quality Control Circle -Cross-Functional Management 3.Actual Method forControl -Quality Control Story -Statistic Methods (SQC) -Self-Control Activities 4 Case Study 5.Quality Assurance (related to ISO 9000)	Mr.SHIMADA (JICA Expert)	35 persons (TISI Staffs)

No	DATE/VENUE	MAIN THEME	SUB THEME	LECTURER	ATTENDANCE
19	29-30 July 1993/ ISTTC	STANDARDS AND BASIC SAFETY TEST FOR ELECTRIC PRODUCTS (3rd) [COOPERATED with TPA]	1.General Concept of Industrial Standards 2.Foreign Safety Standards 3.Standard Laboratory & Standard Procedure of Testing 4.Basic Theory of Safety Tests 5.Demonstration & Practice	ISTTC Staffs 1.Ms.Kobkun 2.Mr.Narat 3.Mr.Thammachni	22 persons (Private Sector)
20	10 Jun 1993/ISTTC	STANDARDIZATION : INTRODUCTION TO ISTTC (1st)	1.Scope & Responsibility 2.Testing & Training Management 3.Testing Laboratory Study Tour	1.Mr.Suraaak (ISTTC's Director) 2.Mr.Udom (ISTTC staff)	6 trainees (UNIDO) from the People's Rebic of Bangladesh
21	5 Aug. 1993/ISTTC	INTRODUCTION TO ISO 9000. SERIES (1st) [VOLUNTARY STANDARDS]	1.Definition & Objective 2.The Constituent Part of ISO 9000 Series 3.Quality System 4.Quality Manual 5.Management of Quality System 6.Document Control	Mr.aurasak (ISTTC's Director)	45 persons (Private Sector)
22	26 Aug 1993/ISTTC	INTRODUCTION TO ISO 9000 SERIES (2nd) [VOLUNTARY STANDARDS]	1.Definition & Objective 2.The Constituent Part of ISO 9000 Series 3.Quality System 4.Quality Manual 5.Management of Quality System 6.Document Control	Mr.aurasak (ISTTC's Director)	45 persons (Private Sector)

No	DATE/VENUE	MAIN THEME	SUB THEME	LECTURER	ATTENDANCE
23	27 Aug. 1993/ISTTC	STANDARDS FOR PROTECTIVE HELMETS FOR ROAD USER (COMPLUSORY STANDARDS)	1.General Concept of Industrial Standards 2.Standards for Protective Helmets for Road User (Principle & Techniques) 3.Testing Demonstration	ISTTC Staffs 1.Mr.Vichai 2.Mrs.Kobkun(C/P) 3.Mr.Ma-nop	23 persons (Private Sector)
24	23 Sep 1993/ISTTC	STANDARDS FOR OPERATION OF PRECISION EQUIPMENT (1st)	1.Basic Theory of Precision Equipment 2.Demonstration & Practice	ISTTC staffs -Mr.Pranot -Mr.Boonsong	25 persons (Private Sector)
25	24 Sep 1993/ISTTC	STANDARDIZATION AND STANDARDS FOR A.C. ELECTRIC FANS (SAFETY REQUIREMENT) (2nd) [SAFETY STANDARDS]	1.Standards for A.C.Electric Fans (Principle & Techniques) 2.Testing Demonstration & Practice	ISTTC Staffs -Mr.Narat -Mr.Wasin -Mr.Piboon -Mr.Warapoj -Mr.Yongyud	22 persons (Private Sector)
26	24-25 Nov. 1993/ ISTTC	STANDARDS FOR THE MECHANICAL TESTING OF INDUSTRIAL PRODUCTS AND PRECISION EQUIPMENT (7th) [COOPERATED with TPA]	1.General Concept of Industrial Standards 2.Standard Laboratory & Standard Procedure of Testing 3.Basic Theory of Mechaniccal Tests and Precision Equipment 4.Demonstration & Practice	ISTTC Staffs -Ms.Kobkun -Mr.Thammachai -Mr.Pranot -Mr.Chana	20 persons (Private Sector)
27	19 Jan. 1994/ISTTC	STANDARDS FOR STEEL BAR FOR REINFORCED CONCRETE (1st) (COMPLUSORY STANDARDS)	1.Standards for Steel Bar for Reinforced Concrete (Principle & Techniques) 2.Testing Demonstration -Mechanical Properties -Chemical Compositions	ISTTC staffs -Mr.Samphun -Mr.Chana -Mr.Prasard	24 persons (Private Sector)

No	DATE/VENUE	MAIN THEME	SUB THEME	LECTURER	ATTENDANCE
28	2 Mar. 1994/SIAM CITY HOTEL BANGKOK	VEHICLE EMISSION CONTROL TECHNOLOGY (By NEDO & JARI'S COOPERATION)	1.The Trends of Enviroment Improvement Technology in Japan -The Trend of Enviroment Improvement -Measures to Improve The Traffic Jam -Inspection & Maintenance 2.Gasoline Engine Technology for Emission Reduction -Pollutant Formation -Effect of Engine Operating Conditions on Pullutant -Emission Control Technology --Maintenance for Low Emission -Future Emission Control Technology 3.Diesel Engine Technology for Emission Reduction -Relation between Exhaust Emission & Diesel Combustion -Exhaust Emission Control Factor -Combustion Improvement Technologies until Update -Future Technology	1.Dr.Hironari KACHI 2.Mr.Takayoshi SUGIMOTO 3.Mr.Hideo SUTO Japan Automobile Research Institute Inc.(JARI)	50 persons (The Public & Private Sector)
29	15 Mar. 1994/ISTTC	STANDARDS FOR OPERATION OF PRECISION EQUIPMENT (2nd)	1.Basic Theory of Precision Equipment 2.Demonstration & Practice	ISTTC staffs -Mr.Pranot -Mr.Boonsong	26 persons (Private Sector)
30	18 Mar. 1994/ISTTC	STANDARDIZATION : INTRODUCTION TO ISTTC (2nd)	1.Scope & Responsibility 2.Testing & Training Management 3.Testing Laboratory Study Tour	1.Mr.Surasak (ISTTC's Director) 2.Ms.Ratchadatorn (ISTTC staff)	15 TISI staffs & One trainee from the Socialist Republic of Vietnam

No.	DATE/VENUE	MAIN THEME	SUB THEME	LECTURER	ATTENDANCE
31	24 Mar 1994/ISTTC	STANDARDS FOR STEEL BAR FOR REINFORCED CONCRETE (2nd) (COMPLUSORY STANDARDS)	1.Standards for Steel Bar for Reinforced Concrete (Principle & Techniques) 2.Testing Demonstration -Mechanical Properties -Chemical Compositions	ISTTC staffs -Mr.Semphun -Mr.Suchat -Ms.Ratchadatorn -Mr.Boonsong	22 persons (Private Sector)
32	17,23,24,31 Mar. 1994 1,7,8,14,15,21,22,28, 29 Apr. 1994 5,6,12,13,19,20,26,27 May 1994 2,3,9,10,16,17,23,24, 30 Jun 1994 1,7,8,14,15,21,22,28, 29 Jul.1994 ISTTC/TISI/ FACTORIES	QUALITY CONTROL LECTURER	1.Orientation 2.Invitation to TQM 3.Quality Control 4.Policy Control 5.Total Productive Management 6 Measurement 7.Reliability 8.Quality Engineering 9.Factory Visit -Implementation of Successful -Upgrade of 5S Activities -Improvement & Cost Reduction	Mr.SHIMADA (JICA Expert)	13 persons (TISI Staffs)
33	10 May 1994/ISTTC	INTRODUCTION TO ISO 9000 SERIES (3rd) [COOPERATED with TPA]	1.Definition & Objective 2.The Constituent Part of ISO 9000 Series 3.Quality System 4.Quality Manual 5.Management of Quality System 6.Document Control	Mr.ouraaak (ISTTC's Director)	52 persons (Private Sector)

No.	DATE/VENUE	MAIN THEME	SUB THEME	LECTURER	ATTENDANCE
34	17-18 May 1994/ ISTTC	STANDARDS AND BASIC SAFETY TEST FOR ELECTRIC PRODUCTS (4th) [COOPERATED with TPA]	1.General Concept of Industrial Standards 2.Foreign Safety Standards 3.Standard Laboratory & Standard Procedure of Testing 4 Basic Theory of Safety Tests 5 Demonstration & Practice	ISTTC Staffs 1.Mr.Narat 2.Mr.Yongyud 3.Mr.Bandit 4.Mr.Thammachai 5.Ms.Kobkun(C/P)	11 persons (Private Sector)
35	20-21 Jul 1994/ ISTTC (TRAINING PLAN)	STANDARDS FOR THE MECHANICAL TESTING OF INDUSTRIAL PRODUCTS AND PRECISION EQUIPMENT (8th) [COOPERATED with TPA]	1.General Concept of Industrial Standards 2.Standard Laboratory & Standard Procedure of Testing 3.Basic Theory of Mechaniccal Tests and Precision Equipment 4 Demonstration & Practice	ISTTC Staffs -Mr.Vinai (C/P) -Mr.Thammachai -Mr.Pranot -Mr.Chana	Approx. 20 persons (Private Sector)
36	28 Jul. 1994/ISTTC (TRAINING PLAN)	STANDARDS FOR ELECTRIC IRON	1.Standards for Electric Iron (Principle & Techniques) 2.Testing Demonstration	ISTTC Staffs -Mr.Narat -Mr.Wasin -Mr.Piboon	Approx. 20 persons (Private Sector)
37	5 Aug. 1994/ISTTC (TRAINING PLAN)	AIR-COOLED SPLIT TYPE AIR CONDITIONER (1st) (VOLUNTARY STANDARDS)	1.Standards for Air-Cooled Split Type Air Conditioner (Principle & Techniques) 2.Testing Demonstration	ISTTC Staffs -Mr.Theera -Mr.Narat	Approx. 20 persons (Private Sector)
38	24 Aug 1994/ISTTC (TRAINING PLAN)	INTRODUCTION TO ISO 9000 SERIES (4th) [COOPERATED with TPA]	1.Definition & Objective 2.The Constituent Part of ISO 9000 Series 3.Quality System 4.Quality Manual 5.Management of Quality System 6.Document Control	Mr.aurasak (ISTTC's Director)	Approx 45 persons (Private Sector)

No.	DATE/VENUE	MAIN THEME	SUB THEME	LECTURER	ATTENDANCE
39	13 Sep 1994/ISTTC (TRAINING PLAN)	AIR-COOLED SPLIT TYPE AIR CONDITIONER (2nd) (VOLUNTARY STANDARDS)	1.Standards for Air-Cooled Split Type Air Conditioner (Principle & Techniques) 2.Testing Demonstration	ISTTC Staffs -Mr.Theera -Mr.Naret	Approx. 20 persons (Private Sector)
40	21-22 Sep 1994/ ISTTC (TRAINING PLAN)	NON-DESTRUCTIVE EXAMINATION TECHNIQUES FOR INDUSTRIAL PRODUCT'S QUALITY (2th) [COOPERATED with TPA]	1.Overview of NDE 2.Radiography Technique 3.Ultrasonics Principle Instruments Technique 4.Eddy Current Principle Instruments Technique 5.Magnetic Particle Technique 6.Liquid Penetrant Technique 7.Practice & Try out with Instruments	CHULALONGKORN UNIVERSITY -Mr.Pichai -Mr.Chatchai -Mr.Chairoj ISTTC Staffs -Mr.Udomsak -Mrs.Samurji	Approx. 20 persons (Private Sector)

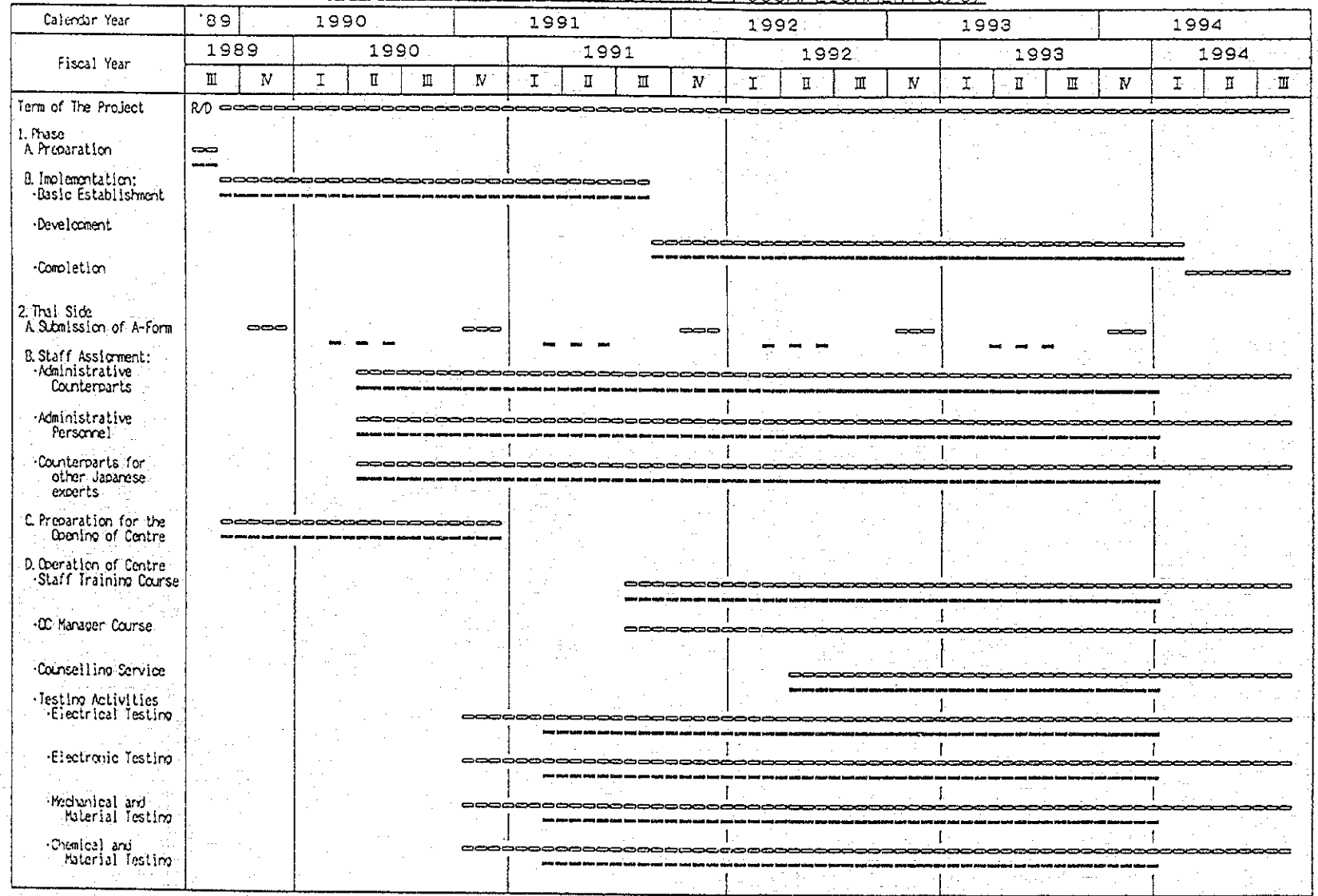
COUNSELING SERVICE

Year	Name of factory	Days
1991	1.Thai Benkan Co.,Ltd.	1
	2.Bangkok Telecom Co.,Ltd.	1
	3.Furukawa Metal (Thailand) Co.,Ltd.	1
	4.Nikkei Thai Alminium Co.,Ltd.	1
	5.Thai-Kobe Welding Co.,Ltd.	1
	6.Kobe Mig Wire (Thailand) Co.,Ltd.	1
	7.NHK Spring (Thailand) Co.,Ltd.	1
	8.Nippon Denso Thailand Co.,Ltd.	1
	9.Isuzu Motors Company (Thailand)	1
	10.Isuzu Engine Manufacturing Co.,	1
1992	1.Thai Dyeing Ltd.	1
	2.Okamoto Thai Co.,Ltd.	1
	3.Thai Steel Bars Ltd.	1
	4.Steel Works Ltd.	1
	5.Glory Kawasaki Motors Co.,Ltd.	1
	6.Thai Honda Manufacturing Co.Ltd	1
	7.Ajinomoto Co. (Thailand) Ltd.	1
	8.Tostem Thai Co.,Ltd.	1
	9.Sunstar Engineering (Thailand)	1
	10.Daikin Industries (Thailand) Ltd.	1
	11.Teijin Polyester (Thailand) Ltd.	1
1993	1.Melco Consumer Products (Thailand) Co.,Ltd.	2 (Feb.24,Dec.2)
	2.MHI-Mahajak Air Conditioners Co.,Ltd.	3 (Feb.25,May25,Jul21)
	3.Unifab Equipment Co.,Ltd.	1 (Mar.16)
	4.Siam Furukawa Battery Co.,Ltd.	1 (May 27)
	5.Bangkok Telecom Co.,Ltd.	1 (June 1)
	6.Slot-Nankai Co.,Ltd.	1 (Oct.12)
	7.Fujitsu General (Thailand) Co.,Ltd.	1 (Oct.12)
	8.Daikin Industries (Thailand) Co.,Ltd.	1 (Dec.21)
1994	1.Varopakorn Co.,Ltd.	5 (March to August)
	2.Siam Cast Iron Works Co.,Ltd.	5 (April to August)
	3.The Bangkok Iron and Steel Works Co.,Ltd.	5 (April to August)
	4.Thai Cane Paper Public Co.,Ltd.	4 (June to July)
	5.Thai Q.P.Co.,Ltd.	4 (May to August)
	6.Melco Consumer Products (Thailand) Co.,Ltd.	8 (June and July)
	7.MHI-Mahajak Air Conditioners Co.,Ltd.	9 (June and July)
	8.Kobe Mig Wire (Thailand) Co.,Ltd.	5 (June and July)
	9.Daikin Airconditioning (Thailand) Ltd.	7 (May and July)
	10.Thai-Joetsu CO.,Ltd.	3 (August)
	11.Tostem Thai Co.,Ltd.	10 (March and August)
	12.Toshiba Consumer Product (Thailand) Co.,Ltd	6 (September)
	13.Thai-Sarco Ltd.	3 (September)
	14.Sharp Appliances (Thailand) Ltd.	6 (September)
	15.Hitachi Consumer Products (Thailand) Ltd.	6 (October)
	16.MALA Co.,Ltd.	5 (October)
	17.Siam Matsushita Co.,Ltd.	2 (March)
Total	46 factories	125 days

Contents of Counseling	(1) 5S (Discard un-necessary, Put-in-order, Cleaning-up, Good house-keeping and Discipline) (2) Total Productive Management (TPM) (3) QC Story and Cause-and-Effect Diagram (4) QC Process Chart (5) Total Quality Management in factory (6) Others about QC techniques by request

K.I.

SCHEDULE OF IMPLEMENTATION AND ACCOMPLISHMENT (1/3)



[Remark] ⊖⊖⊖ : Schedule , ——— : Accomplishment

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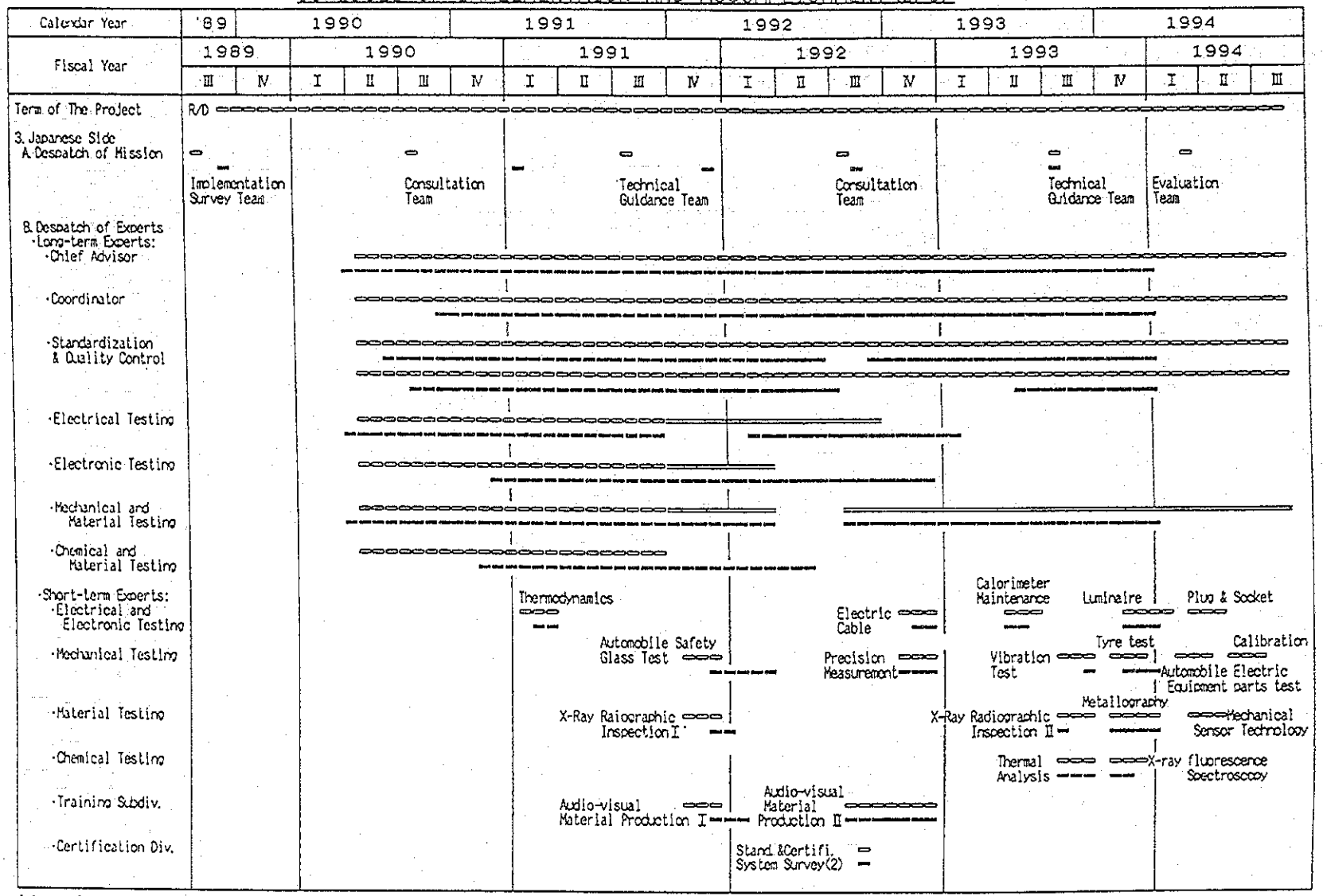
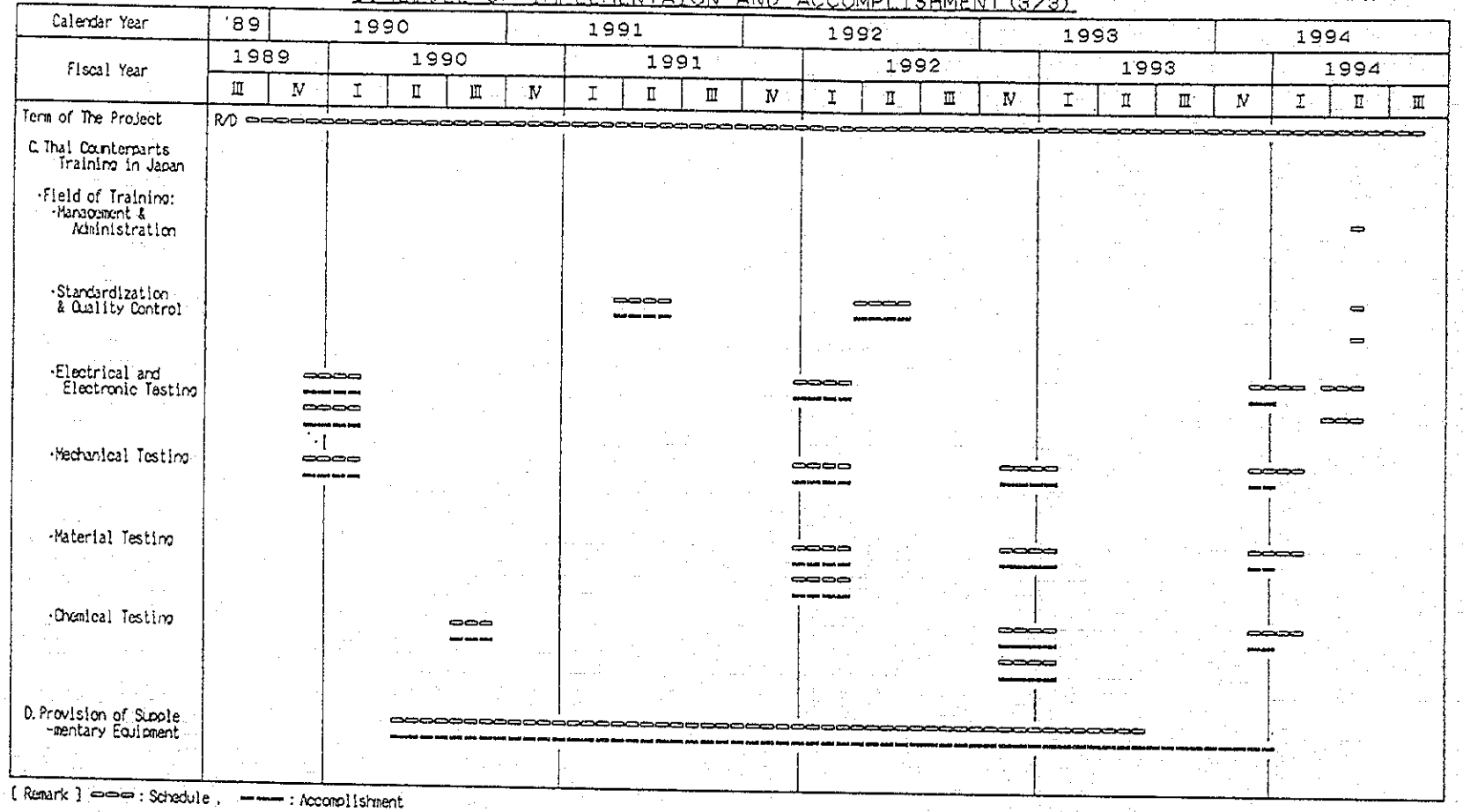


[Remark] ▭▭▭ : Schedule , ═══ : Revised Schedule , ▬▬▬ : Accomplishment

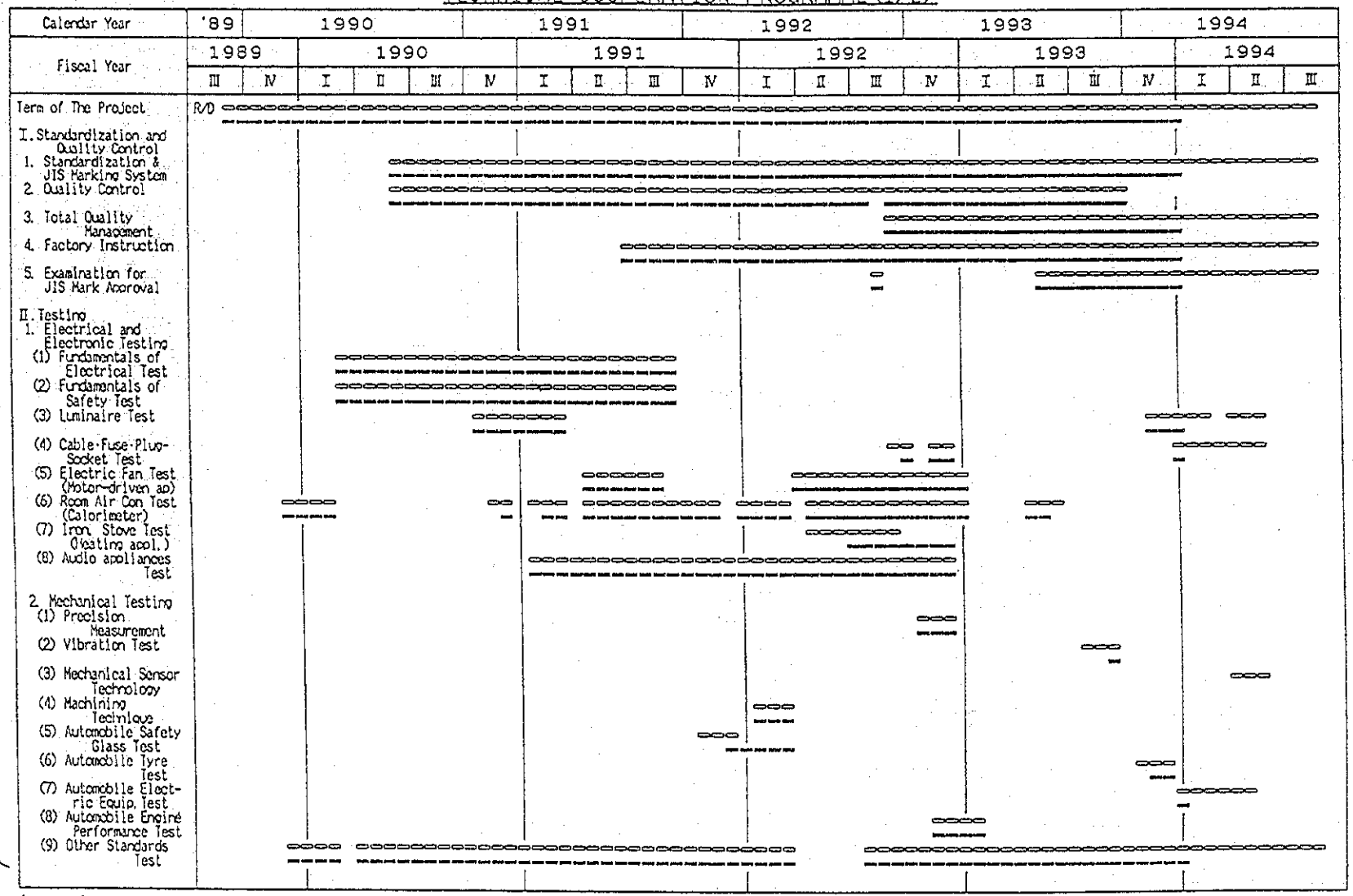
Annex 9

SCHEDULE OF IMPLEMENTATION AND ACCOMPLISHMENT (3/3)



Annex 10

TECHNICAL COOPERATION PROGRAMME (1/2)



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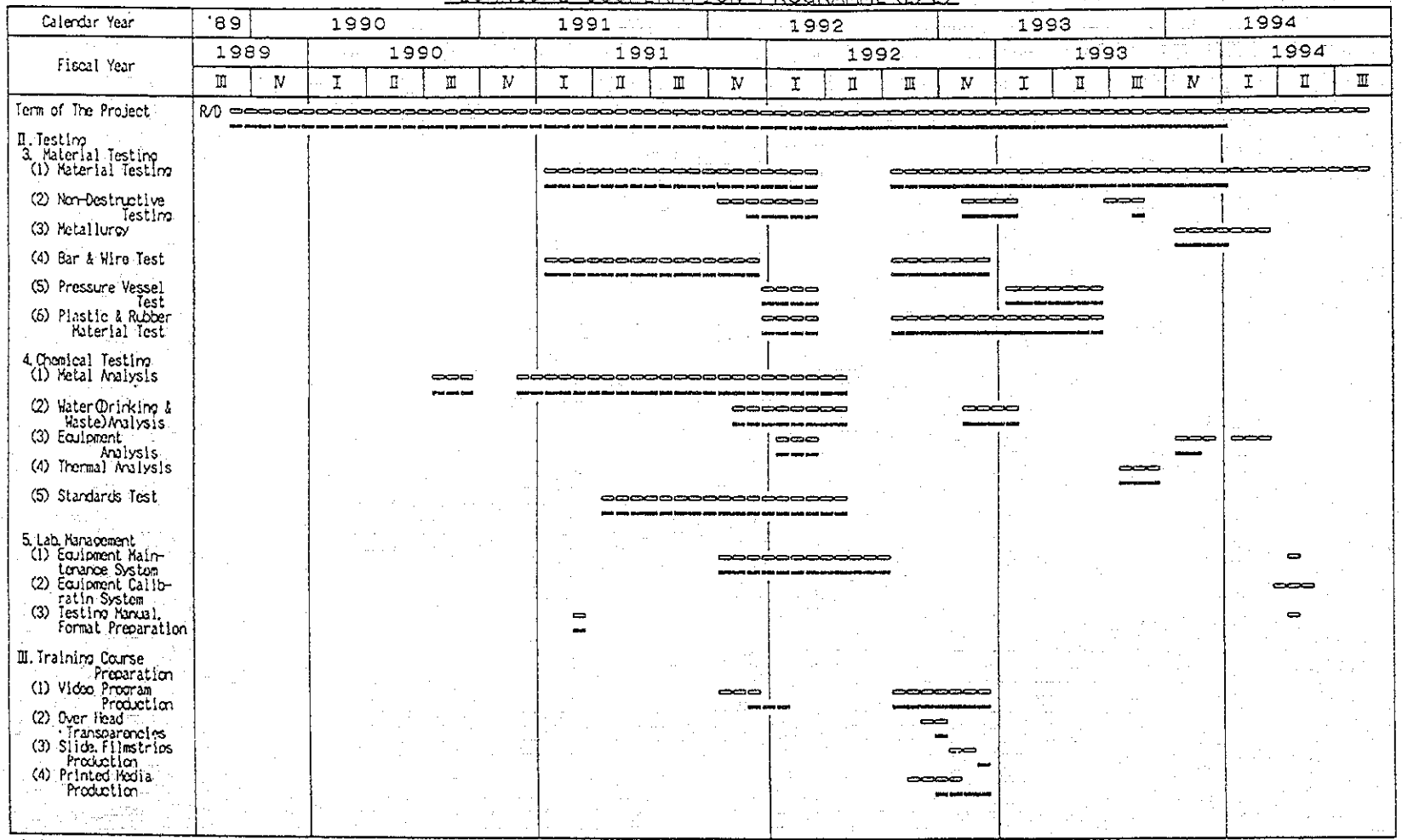
Annex 10

TECHNICAL COOPERATION PROGRAMME (2/2)



[Remark] ▭▭▭ : Schedule, ▬▬▬ : Accomplishment

ITEMS OF TECHNOLOGY TRANSFER

Annex 11

I Standardization Quality Control

○ △	1. Standardization and JIS Marking System
○ △	2. Quality Control
	(1) PDCA Cycle
	(2) 5M, 1M, 4M
	(3) 5S
	(4) QC 7 Tools
	(5) QC Story
	(6) Sampling Inspection
	(7) Design of Experiment
	(8) QC Circle
	(9) New QC 7 Tools
	(10) JUSE-QCAS
○	3. Total Quality Management
	(1) Concept of TQM
	(2) TPM
	(3) Policy Control
	(4) Measurement
	(5) Reliability
	(6) Quality Engineering
	(7) Audit
	(8) Cross-functional management
	(9) Operation manual
	(10) Motivation
	4. Factory Instruction
	5.
○ △	Examination for JIS Mark Approval
	(1) General Items
	・JIS Law
	・O C
	(2) Specific Items
	・JIS Factory
	Application Procedures
	Factory Examinations
	Examination Reports
	Annual Inspection for JIS Mark Factories
	・Specific Foreign Inspection Body
	Role of SFIB
	Application Procedures
	Obligations of SFIB
	Collection of Reports, Spot Inspection etc.
	Cancellation of Designation
	・Simulation of On-site Factory Inspection
	(3) Preparation for SFIB Application

II Testing Technology

1. Electrical & Electronic Test

○	1. Fundamentals of Electrical Test
	(1) Method of Measurement: Electric Current, Voltage, Temperature, Power, Insulation Performance, Resistance, Impedance
	(2) Photometry
	(3) Knowledge of Appliances: Heating Appl., Refrigerating Appl., Luminaires, Rotating Machinery
○	2. Fundamentals of Safety Test
	(1) Scope, Definition, Marking & Labelling etc.
	(2) Requirements: Protection for Electrical Shock, Power Cord Protection, Moisture Resistance, Leakage Current, High Voltage, Insulation Resistance, Earthing, Test Finger, Input Test
○ △ C	3. Luminaire Test
○ ● △ C	(1) Incandescent Lamps
● △ C	(2) Fluorescent Lamps & parts
● △ C	4. Cable and Cord Test
○ C	(1) PVC-Insulated Cables & Cords
○ △ C	(2) PVC-Insulated Al Cables
○ C	5. Fuse Test
○ C	6. Electric Fan Test
○ C	7. Electric Iron Test
○ ● △	8. Electric Stove Test
○	9. Room Air Conditioner Test (Calorimeter)
○	10. Radio Receiver Test
○	11. Tape Recorder Test
○	12. Speaker Test
○ ● △	13. Plug and Socket Test
○ △	14. Others

2. Mechanical Test

○ ●	1. Precision Measurement
	(1) Fundamentals of Precision Measurement: Blockgauge, Micrometer, Dial Gauge, Linear Height, Surface Roughness Tester, Roundness Measuring Machine, Profile Projector, Toolmakers Microscope, 3-D Coordinate Measuring Machine
●	2. Vibration Test
	(1) Vibration Theory
	(2) Measurement of Vibration
●	3. Mechanical Sensor Technology
○	4. Machining Technique
	(1) Lathe
	(2) Milling Machine
	(3) Surface Grinder
	(4) Design
● C	5. Automobile Safety Glass Test
	(1) Laminated Safety Glass
● C	(2) Tempered & Zone Tempered S.G.
○ C	6. Road Users Protective Helmet Test
	7 Automobile Tyre Test
	8 Automobile Electric Equipment & Parts Test
○ △	(1) Batteries
● △	(2) Alternators
● △	(3) Starter Motors
○ ●	(4) Wiper Motors
● △	(5) Spark Plugs
● △	(6) Ignition Coils
	9. Automobile Engine: Performance & Parts, Lubricant Test
○	10. Motorcycle Exhaust Muffler Test
○	11. Automobile Brake Lining Test
○	12. Hydraulic Shock Absorber Test
○	13. Spring Test: Helical and Laminated Springs
○	14. V-belt Test
○	15. Seat belt Test (Advice on Equipment Design)
○	16. Others

3. Material Test

○ △	1. Material Testing
	(1) Tensile, Compression, Bending, Torsion Test
	(2) Hardness Test
	(3) Impact Test
	(4) Fatigue Test
	(5) Creep Test
	2. Non-Destructive Testing
● △	(1) X-Ray Radiographic Test
△	(2) Ultrasonic Testing
△	(3) Eddy Current Testing
△	(4) Magnetic Particle Testing
●	3. Metallurgy
	(1) Metallography
	(2) Heat Treatment
	(3) Microscope Photograph Technique
○	4. Bar Test
C	(1) Steel Bars for Reinforced Concrete
○	5 Wire Test
	(1) Steel Wire for Prestressed Concrete
	6 Pressure Vessel Test
○ △ C	(1) Liquefied Petroleum Gas Containers
○ △ C	(2) L.P.Gas Cylinder for Internal Combustion Engines
○	7 Plastic Material Test: PVC Pipes for Drinking Water Service, etc.
C	8. Rubber Test: Tubes for Automobile Tyres, etc
○	9. Others

4. Chemical Test

○	1. Chemical Analysis of Iron and Steel:
	(1) Si
	(2) Mn
	(3) Pb
	(4) S
	(5) Mo
	(6) Ni
○	2. Chem. Analysis of Bronze Casting
○	3. Chem. Analysis of Bauxite Ores
○	4. Chem. Analysis of Cu & Cu Alloy
○ △	5. Chem. Analysis of Drinking Water
○ △	6. Chem. Analysis of Waste Water
	7. Equipment Analysis
● △	(1) X-ray Fluorescent Spectroscopy
○ △	(2) Emission Spectroscopy
○ △	(3) Atomic Absorption Spectroscopy
○ △	(4) UV-Visible Spectroscopy
	(5) Induction Coupled Plasma Spectroscopy
●	8. Thermal Analysis
	(1) Thermo-Mechanical Analysis
	(2) Differential Thermal Analysis
	(3) Differential Scanning Calorimetry
○	9. Chemical Analysis Test of Some Non-Metallic Materials
○	10. Test of Some Reagents for Industrial Use
○	11. Others

II 5 Laboratory Management

○	1. Equipment Maintenance System
○ ●	2. Equipment Calibration System
○	3. Testing Manual, Format and Preparation

III Audio-Visual Material Production

●	1. Video Programs
●	2. Overhead Transparencies
●	3. Slide Series and Filmstrips
●	4. Printed Media

○ : Technology Transfer by long term Expert

● : Technology Transfer by short term Expert

△ : Technology Transfer by CP training in Japan

C : Compulsory Standard

PREPARATION OF OPERATION MANUALS

Name of Subdivision	No.of Eqipment	No.of existing Manuals	No.of Equipment operatable without Manuals*
Testing Subdivision 1	96	94	2
Testing Subdivision 2	91	81	10
Testing Subdivision 3	26	26	0
Testing Subdivision 4	8	8	0
Training Subdivision	27	22	5
Total	248	231	17

* gauges, jigs and basic electrical meters

NUMBER OF STANDARDS WITH COMPLETED TESTING PROCEDURE MANUALS

Name of Sub.Division	Number of Standards
Sub.Division 1	10
Sub.Division 2	17
Sub.Division 3	4
Sub.Division 4	18
Total	49

Data as May.94

EQUIPMENT OPERATIONAL CAPABILITY
LIST OF MAJOR EQUIPMENT AT THE ISTTC

I. ELECTRICAL AND ELECTRONIC TESTING

(1/19)

No.	Equipment name	Manufacturer	Model,Type	Qty.	Room
1	Digital multimeter	NATIONAL	VP-2710A	2	212
2	Digital multimeter	YEW	7542	2	212
3	Clamp multimeter	HIOKI	3104	2	212
4	Digital circuit tester	HIOKI	3231	10	212
5	Capacitance meter	ANDO	AG-4304	1	212
6	Wheatstone bridge	YEW	2768	1	108
				1	207
7	Double bridge	YEW	2752	2	108
8	Electronic galvanometer	YEW	2709	1	108
				1	207
9	Decade resistance box:Low Z	YEW	2793	4	108
				1	207
10	Decade resistance box:high Z	YEW	2793	4	108
11	Resistors for discharge test	TAIYO KEIKI	-	1	212
12	Switch resistance tester	NATIONAL	VP-2811A	2	212
13	Oscilloscope	NATIONAL	VP-5566A	3	211
14	Storage oscilloscope	IWATSU	MS-5311	1	211
15	Frequency meter	YEW	2038	4	212
16	Digital stroboscope	SUGAWARA	OSK-4795	2	211
17	Digital thermometer and	YEW	2572	2	211
	30 point selector	YEW	2815	2	211
18	Hybrid recorder	YEW	3081	2	211
19	Hybrid recorder	YEW	3087	6	211
20	Flat bed recorder	TOA DEMPA	FBR-253A	4	211
21	x-y recorder	GRAPHTECH	WX-1200	2	211
22	x-y recorder	GRAPHTECH	WX-2300-2Z	2	211
23	x-y recorder	GRAPHTECH	WX-2400-2Z	2	211
24	AC single phase voltage regulator	MATSUNAGA	TA-229	3	212
25	AC single phase voltage regulator	MATSUNAGA	TA-2245	2	207

No.	Equipment name	Manufacturer	Model,Type	Qty.	Room
26	AC single shase voltage regulator	MATSUNAGA	TA-229V	1	211
27	AC three phase voltage regulator	MATSUNAGA	TA3-10-380G	1	212
28	High voltage testing device				108
	(1)Control board	OGAWA SEIKI	OSK6593	1	
	(2)Impluse gernerator	TTC	-	1	
	(3)Digital storage oscilloscope	TEKTRONIX	2221	1	
	(4)Oscilloscope camera	TEKTRONIX	C-5C	1	
29	High voltage power supply unit	OGAWA SEIKI	OSK11912	1	212
30	Mega-Ohm tester	YEW	3213	1	212
				1	108
31	Insulation and breakdown tester	KIKUSUI	TOS8700	1	113
				1	108
32	Insulation and breakdown tester	KIKUSUI	TOS8650	1	212
				1	210
				1	208
33	Insulation resistance meter	ANDO	HR-4G	2	207
34	Insulation resistance meter	TOA DEMPA	SM-10E	2	211
35	High frequency breakdown tester	TOKYO SEIDEN	OSK 10231-Sp	1	212
36	Spark tester	YASUDA SEIKI	160 (YST-1)	1	108
37	tracking resistance tester	TOKYO SEIDEN	OSK10229-A-SP	1	208
38	Arc resistance tester	TOKYO SEIDEN	OSK10229-C-SP	1	208
39	Leakage current tester	SIMPSON	229-2	4	212
40	Earth continuity tester	KIKUSUI	TOS 6100	2	212
41	Safety test tool kit				212
	(1) Spring impact test hammer	EXCEL	CB-1	1	
	(2) Push pull gauge	EXCEL	CB-1	1	
	(3) Test finger	EXCEL	CB-1	4	
	(4) Test pin	EXCEL	CB-1	1	
	(5) Ball pressure	EXCEL	CB-1	1	
	(6) Sharp edge tester	EXCEL	CB-1	1	
	(7) Steel sphere	EXCEl	CB-1	1	
	(8) IS gauge	EXCEL	CB-1	1	

No.	Equipment name	Manufacturer	Model,Type	Qty.	Room
42	Standard Lamp caps and holdus for dimension testing				212
	(1) Gauge for the slots in lampholder B15	DAIICHI SOKUHAN	7006-13-14	1	
	(2) Gauge for the slots in lampholder B22	DAIICHI SOKUHAN	7006-13-14	1	
	(3) Plug gauge for E27 lampholder for testing contact making	DAIICHI SOKUHAN	7006-13-14	1	
	(4) Plug gauge for E27 lampholder for testing protection against contact	DAIICHI SOKUHAN	7006-13-14	1	
	(5) Plug gauge for E27 lampholder for testing contact making and protection against	DAIICHI SOKUHAN	7006-22-3	1	
	(6) Plug gauge for E40 lampholder for testing contact making	DAIICHI SOKUHAN	7006-23-2	1	
	(7) Plug gauge for E40 lampholder for testing contact making and protection against accidental contact	DAIICHI SOKUHAN	7006-24-2	1	
	(8) "GO" plug gauge for screw threads of lampholder E40	DAIICHI SOKUHAN	7006-25-4	1	
	(9) "GO" plug gauge for screw threads of lampholder E27	DAIICHI SOKUHAN	7006-25A-1	1	
	(10) "NOT GO" plug gauge for screw threads of lampholder E27	DAIICHI SOKUHAN	7006-26-2	1	
	(11) "NOT GO" plug gauge for screw threads of lampholder E40	DAIICHI SOKUHAN	7006-26-2	1	

No.	Equipment name	Manufacturer	Model,Type	Qty.	Room
	(12) "GO" gauge for dimension "S1" of E27 Cap on finished lamp	DAIICHI SOKUHAN	7006-27B-1	1	
	(13) "GO" Gauge for dimension "S1" of E27 Cap on finished lamp	DAIICHI SOKUHAN	7006-27C-1	1	
	(14) "NOT GO" Gauge for E27 cap on finished lamp	DAIICHI SOKUHAN	7006-28A-1	1	
	(15) "NOT GO" Gauge for E27 cap on finished lamp	DAIICHI SOKUHAN	7006-28-1	1	
	(16) "GO and "NOT GO" Gauge for BI-PIN cap G13 : NOT for use on finished lamp	DAIICHI SOKUHAN	7006-44-3	1	
	(17) "GO" Gauge for BI-PIN cap G13 on finished lamp	DAIICHI SOKUHAN	7006-45-3	1	
	(18) "GO" and "NOT GO" Gauge for BI-PIN cap G5 : NOT for use on finished lamp	DAIICHI SOKUHAN	7006-46-2	1	
	(19) "GO" Gauge for BI-PIN cap G5 on finished lamp	DAIICHI SOKUHAN	7006-46A-2	1	
	(20) Plug gauge for inflexible lampholder G5 for testing contact making	DAIICHI SOKUHAN	7006-47A-1	1	
	(21) Gauge for finished lamp fitted with E27 cap for testing contact making	DAIICHI SOKUHAN	7006-50-1	1	
	(22) Gauge for finished lamp fitted with E27 cap for testing protection against accidental contact	DAIICHI SOKUHAN	7006-51-1	1	
	(23) Gauge for finished lamp fitted with E27 cap for testing protection against accidental contac	DAIICHI SOKUHAN	7006-51A-1	1	

No.	Equipment name	Manufacturer	Model,Type	Qty.	Room
	(24) Gauge for finished lamp fitted with E40 cap for testing contact making	DAIICHI SOKUHAN	7006-52-1	1	
	(25) Gauge for finished lamp fitted with E40 cap for testing protection against accidental contace	DAIICHI SOKUHAN	7006-53-1	1	
	(26) Plug gauge for inflexible lampholder G13 for testing contact making	DAIICHI SOKUHAN	7006-60A-1	1	
43	Enamel wire testing	YASUDA SEIKI	553	1	212
44	Cord flexing tester				113
	(1) Capture cord flexing tester	EVERTRON	-	1	
	(2) Load box	EVERTRON	-	1	
45	Cord bending fatique tester	TESTER SANGYO	BE-801-M	1	113
46	Triple parallel plate plastometer	TOYO SEIKI	334W-3	1	113
47	Tunble barrel	TAIYO KEIKI	-	1	113
48	Test table for heating test	TAIYO KEIKI	-	1	212
49	Hot mendrel heat resistance tester	EXCEL	T-01.05	1	208
50	V-belt electrical resistance measurment stand	TAIYO KEIKI	-	1	212
51	Flamability tester	EXCEL	BT-1500A	1	208
52	Muffle furnace	YAMATO KAGAKU	FP-21	1	208
53	Flux meter	YEW	3254	1	212
54	Lux meter	YEW	3281	1	212
55	Photometric integrating sphere				213
	(1) Integratating	TOSHIBA	A	1	
	(2) Measuring rack for incandescent lamp	TOSHIBA	A	1	
	(3) Measuring rack for fluorescent lamp	TOSHIBA	A	1	
	(4) Computer	TOSHIBA	J-3100GX	1	
	(5) Printer	TOSHIBA	PWS5267A	1	

No.	Equipment name	Manufacturer	Model,Type	Qty.	Room
	(6) Standard lamps of flus	TOSHIBA	A	33	
	100 V, 10 W	TOSHIBA	A	3	
	100 V, 20 W	TOSHIBA	A	3	
	100 V, 30 W	TOSHIBA	A	3	
	100 V, 40 W	TOSHIBA	A	3	
	100 V, 60 W	TOSHIBA	A	3	
	100 V,100 W	TOSHIBA	A	3	
	100 V,150 W	TOSHIBA	A	3	
	100 V,200 W	TOSHIBA	A	3	
	100 V,300 W	TOSHIBA	A	3	
	100 V,500 W	TOSHIBA	A	3	
	100 V,1000 W	TOSHIBA	A	3	
	(7) Standard fluorescent lamps	TOSHIBA	A	6	
	(8) Reference ballast 20 W	TOSHIBA	A	1	
	(9) Reference ballast 32 W	TOSHIBA	A	1	
	(10) Reference ballast 40 W	TOSHIBA	A	1	
56	Photometric bench				213
	(1) Bench 4 meters	TOSHIBA	-	1	
	(2) Lamp fixing stand	TOSHIBA	-	1	
	(3) Shad	TOSHIBA	-	5	
	(4) Photo receiver	TOSHIBA	-	1	
	(5) Standard lamps of intensity	TOSHIBA	B	18	
	8 V, 10 Cd	TOSHIBA	B	3	
	30 V, 40 Cd	TOSHIBA	B	3	
	100 V, 150 Cd	TOSHIBA	B	3	
	100 V, 370 Cd	TOSHIBA	B	3	
	100 V, 900 Cd	TOSHIBA	B	3	
	100 V, 3,000 Cd	TOSHIBA	B	3	
57	Digital photometer	TEKTRONIX	J16	1	213
58	Colorimetry				213
	(1) Colorimetry set	TOSHIBA	-	1	
	(2) Lamp lighting table	TOSHIBA	-	1	
	(3) Computer	TOSHIBA	J-3100GX	1	
	(4) Printer	TOSHIBA	PWS5267A	1	

No.	Equipment name	Manufacturer	Model,Type	Qty.	Room
	(5) Standard lamps of colout temp	TOSHIBA	B	1	
59	Lamp chamber tester	TAIYO KEIKI	-	1	212
60	Life test rack for incandescent lamp	TOSHIBA	-	1	113
61	Life test rack for fluorescent lamp	TOSHIBA	-	1	113
62	Testing circuits for fluorescent lamp	TOSHIBA	-	1	212
63	Testing circuits for incandescent lamp	TAIYO KEIKI	-	1	212
64	CAM/FM signal generator	NATIONAL	VP-8179B10	2	211
65	Stereo signal generator	NATIONAL	VP-7635A	1	211
66	Audio signal generator	TOA DEMPA	CRS-121A	2	211
67	Function generator	NATIONAL	VP-7420A	1	211
68	Electronic voltmeter	NF	M-174B	5	211
69	Frequency counter	KIKUSUI	FC01130	2	211
70	Audio analyzer	NATIONAL	VP-7722A	2	211
71	Wow flutter meter	KIKUSUI	677D	2	211
72	Oscilloscope	KIKUSUI	COM7200A	1	211
73	Field strength meter	ANRITSU	M-262F	1	211
74	Field strength meter	ANRITSU	MS-618	1	211
75	Shield room	Nippon shield	AIR-23-WS	1	211
76	AC volt-ammeter	YEW	2014	1	207
77	DC voltage/current standard	YEW	2554	1	207
78	AC voltage/current standard	YEW	2558	1	207
79	Temperature oven	TAKAUGI	-	1	212
80	Anemometer	OGAWA SEIKI	DA-1	2	113
81	Heating efficiency test stand	TAIYO KEIKI		1	212
82	Mechanical endurances test for speed regulator:rotary type	TAIYO KEIKI	-	1	212
83	Mechanical endurances test for speed regulator:push type	TAIYO KEIKI	-	1	212
84	Microphone 1 inch	BK	4145	2	217
85	Microphone 1 inch	BK	4133	2	217

No.	Equipment name	Manufacturer	Model,Type	Qty.	Room
86	Pre-amplifier	BK	26395	2	217
87	Measuring amplifier	BK	2636	1	217
88	Sine wave generator	BK	1051	1	217
89	Level recorder	BK	2307	1	217
90	Band pass filter	BK	1617	1	217
91	Power amplifier	BK	2706	1	217
92	Sound level meter	RION	NA-29E	1	217
			CP-10	1	
			NC-11	1	
			NA-20	1	
93	Level recorder	RION	LR-04	1	217
94	Pistone phone	RION	NC-72	1	217
95	Anechoic room	-	-	1	217
	(1) Speaker	TANNOY	LYNX	3	
	(2) Speaker	TANNOY	-	1	
96	Calorimeter room			1	219
	(1) Calorimeter control panel	OHNISHI	-	1	
	(2) Control panel	OHNISHI	-	1	
	(3) Room side	OHNISHI	-	1	
	(4) Outdoor side	OHNISHI	-	1	
	(5) Computer	HEWLETT PACKARD	9122C	1	
	(6) Monitor	HEWLETT PACKARD	35731B	1	
	(7) Printer	HEWLETT PACKARD	41031A	1	
	(8) UPS	YAMABISHI	1000HF	1	
	(9) Cyclometric box	CHINO	-	2	
	(10) Pressure equilizer	AENIX	WH-0535	2	
	(11) Scanner for thermocouple	YOKOGAWA	388262	1	
	(12) Electronic balance	AND	-	2	
	(13) Water pump	HITACHI	W-p80F	2	
	(14) Chiller unit	HITACHI	RCU5Y	1	
	(15) Distiller	-	-	1	
	(16) Water pump	HITACHI	WT-K200F	1	
	(17) Air compressure	HITACHI	WT-K200F	1	
	(18) Cooling towm	SHINWA SANGYO	MXC-P50AS	1	
	(19) Refrigerator	SHINWA SANGYO	MXC-P50AS	1	

No.	Equipment name	Manufacturer	Model,Type	Qty.	Room
1	Vernier caliper (150 MM.)	MITUTOYO	530-101	10	112
2	Linear height	MITUTOYO	LHN-600(518-302)	1	112
3	Vernier microscope	MITUTOYO	183-101	2	112
4	Toolmakers microscope	MITUTOYO	TM 311(176-941)	1	112
5	Monitor TV set	MITUTOYO	TVM-91-4/MT	1	112
6	A-counter	MITUTOYO	ARC-1701W	1	112
7	Polariod photographic attachment	MITUTOYO	000121	1	112
8	Digitalic head	MITUTOYO	911276,915281	2	112
9	Micrometer	MITUTOYO	101-103	5	112
10	Damping force tester	TOKYO TESTING	VSSA-2400	1	109
11	Block gauge for dimention measurement	MITUTOYO	516-937	1	112
12	Tubular inside micrometer	MITUTOYO	242-101	1	112
13	Groove micrometer	MITUTOYO	146-202	1	112
14	Dial indicator	MITUTOYO	2406E-08	2	112
15	Profile projector	MITUTOYO	PJ 311	1	112
16	Multilayer coating thickness analyzer	FISCHER	S8.1e5	1	207
17	Tension gauge	NAKAMURA	TK	5	109
18	Drop tester	YASHIDA SEIKI	SBST-950	1	113
19	Creep testing machine	TOKYO TESTING	SB-10	1	218
20	Vibro tester	SHINKEN	G 9210	1	113
21	Vibro measuring instrument	SHINKEN	?-1107	1	113
22	Friction testing machine	TOKYO TESTING	HP-S	1	108
23	Layout machine	MITUTOYO	BN 1020	11	112
24	Roundness measuring machine	MITUTOYO	RA 212 (211-942-30)	1	112
25	Digital roughness tester	MITUTOYO	surftest 402 series 178	1	112
26	Thread gauge	DAI-ICHI SOKUHAN	10 x 1	1	112

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No.	Equipment name	Manufacturer	Model,Type	Qty.	Room
27	Radius gauge	MITUTOYO	186-105	1	112
28	Dial snap gauge	MITUTOYO	201-201	1	112
29	Filler gauge	MITUTOYO	184-302	1	112
30	Metallurgical microscope	NIKON	OPTIPHOT	1	112
31	Metallurgical microscope photrgraphic attachment	NIKON	PFX-35 W.M	1	112
32	Universal bevel protractor	MITUTOYO	187-901	1	112
33	Abrasion resistance tester	YASUDA	-	1	218
34	Standard head form	PRECISION	-	16	108
35	Shock absorption test equipment for helmet	YOSHIDA SEIKI	HSAT-105	1	108
36	Penetration equipment	YOSHIDA SEIKI	HSAT-300	1	108
37	Endurance tester for headrest	TOKYO TESTING	ASHI-24M	1	108
38	Seat frame testing machine	TOKYO TESTING	SR-100-02A/2	1	108
39	V-belt length measurement stand	TOKYO TESTING	SV-10M	1	218
40	Cylinder for flexibility test	TAIYO KEIKI	-	1	218
41	Fasten belt strength test equipment	YOSHIDA SEIKI	HSAT-136	1	108
42	Tachometer (non-contact type)	HIOKI	3404	2	109
43	Tachometer (contact type)	HIOKI	3404-01	2	109
44	Performance test equipment for starter motor	TAIYO KEIKI	-	1	210
45	Endurance test equipment for SW.mag.	TAIYO KEIKI	-	1	210
46	Durability test equipment for wiper motor	TAIYO KEIKI	-	1	210
47	High pressure water pump with pressure gauge	RIKEN KIKI	RJ 22-500	1	108
48	Air pump with pressure gauge	IWATA	SU-751 PB	1	130
49	Water jacket cylinder with expansion gauge	MEIKO SANGYO	-	1	108
50	Air Leak tester	TAIYO KEIKI	-	1	108
51	Air leakage test equipment for spark plug	TAIYO KEIKI	-	1	210

No.	Equipment name	Manufacturer	Model,Type	Qty.	Room
52	Temperature oven	TAKASAGO SEISAKUSHO	-	3	113
53	Gear type oven	YASUDA SEIKI	102-SHF-77	1	113
54	Oil bath with constant temperature device	YAMATO	BF-61, BZ-41	2	113
55	Oil bath	KOMATSU	HLB-7600A	2	113
56	Water bath with thermal control	PRECISION	-	1	108
57	Dust chamber	SUGA	DT-1-CF	1	108
58	Strip cutter	KONGO	SA-6	1	108
59	Alternator tester	RABOTTI	P04,04T	1	210
60	Battery tester	TAKASAGO	BAT30-600	1	210
61	Short circuit tester	BANZAI	DACS-001-2A	1	210
62	High rate tester	TAIYO KEIKI	-	1	210
63	Automatic capacity tester	TAKASAGO	BAT30-600	1	210
64	Automatic battery lifetester	TAKASAGO	BAT30-600	1	210
65	B.Q.tester (spark plug tester)	TAIYO KEIKI	-	1	210
66	Endurance test equipment for ignition coil	TAIYO KEIKI	-	1	210
67	Electronic balance	SHIMADZU	AEU-210	1	112
68	Top load balance	CHYO BALANCE	JPN-24 KV	1	112
69	Temperature/humidity oven	NISSOKU	PH40-3060R	1	113
70	High-low temperature and humidity chamber	NISSOKU	PS60A-7010R	1	113
71	Profile projector	NIKON	V-12A	1	112
72	Leaf spring testing machine	TOKYO TESTING	AS-10-S	1	109
73	Automatic spring testing machine	TOKYO TESTING	AS-5-C	1	109
74	Digital system coil spring testing machine (200kgf)	TOKYO TESTING	TSP-200 DB	1	218
75	Digital system coil spring testing machine (10kgf)	TOKYO TESTING	TSP-10 D	1	218
76	Light projection test apparatus	CHUO	-	1	111
77	Light stability test apparatus	CHUO	-	1	108
78	Optical deviation test equipment	CHUO	-	1	111
79	Uniforming test apparatus	CHUO	-	1	111
80	Electronic level	NIKON	AL-3	1	128

No.	Equipment name	Manufacturer	Model,Type	Qty.	Room
81	Balancing machine for tyre and wheel	MORIMURA	AMIE-X1	1	108
82	Endurance tester for tyre and wheel	MAEKAWA	DF-1700 W	1	108
83	Bead unseating fixture machine	TOKYO TESTING	BAT-02/50-01	1	109
84	Universal thread-cutting lathe	HAMATSU	KAT-435G	1	110
85	Universal milling machine	HAMATSU	WMT-H1300	1	110
86	Cylindrical grinder	MINAKUCHI	LG 45-30T	1	110
87	Universal tool milling and boring machine	MAKINO	C-40	1	110
88	Precision surface grinder	NICCO	NSG 515	1	110
89	Middle type bench drill w/tapping works	ENSHU	ESD-460MT	1	110
90	Shaping machine	HOKUETU	NT-4	1	110
91	Punching press	KYORITSU	KE-06-F	1	110

No.	Equipment name	Manufacturer	Model,Type	Qty.	Room
1	Universal tensile testing	SHIMADZU	UH-100A	1	109
	(1) Control measuring unit		UH-A	1	
	(2) Data processor		DATALETTY402	1	
	(3) Extensometer		ST50-50-25	1	
			ST50-50-45	1	
	(4) Load calibration	TORSEE	ALCT-100	1	
2	Autograph	SHIMADZU	AG-5000A	1	218
	(1) Tension test device for use in thermostatic chamber		B-012-014	1	
	(2) Thermostatic chamber		B-011-013L	1	
	(3) Extensometer with amplifier		SPM-500	1	
	(4) Temperature controler		B-011	1	
	(5) Monitor	MITSUBISHI	NV-1231Y	1	
	(6) Transformer	TOKYO DENKIKI	T3H-125-MB	1	
	(7) Air compressor	TOSHIBA	SKD	1	
3	Polishing machine	MARUMOTO KOGYO	5627-36	1	202
4	Molding	MARUMOTO KOGYO	2426	1	202
5	Pendulum impact tester	TOKYO SEIKI	611	1	218
6	Hardness tester (Vickers)	MATSUZAWA SEIKI	MV-1	1	112
	(1) Hardness standard block (Vickers)	YAMAMOTO KAGARU	HV	1	
7	Hardness tester (Brinell)	SHIMADZU	1941	1	112
	(1) Hardness standard block (Brinell)	YAMAMOTO KAGAKU	HBS, HBW	1	
8	Hardness tester (Rockwell)	SHIMADZU	HR	1	112
	(1) Hardness standard block (Rockwell)	YAMAMOTO KAGAKU	HRA, HRB, HRC	1	
9	Ozone aging tester	YASUDA SEIKI	187-AII	1	113
10	Triple parallel plate plastometer	TOYO SEIKI	534W-3	1	113
11	Diameter porosity meter	TAIYOKEIKI	PA-500	1	210
12	Compression apparatus	TOYO SEIKI	245	1	218
13	Diatometer	SINKURIKO	DL-7000RH/L	1	218