

タイ王国金属加工・機械工業開発振興  
実施協議調査団報告書

昭和61(1986)年9月

国際協力事業団

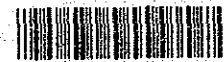




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国際協力事業団

国際協力事業団		
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## はじめに

タイ国政府は経済自立促進，経済基盤強化のため，1981年10月から始まった第5次国家経済社会開発5ヶ年計画および1986年10月から始まる第6次5ヶ年計画においても，国の工業化を支える中小工業の育成に力を注いでいる。

その一環としてタイ国政府は，1) 金属加工技術の教育訓練，2) 中小企業工場への助言および指導，3) 適正な生産技術の開発と試作および受託試験検査，4) 技術情報の普及等を目的とする「金属加工・機械工業開発研究所(MIDI)」の設立に関する無償資金援助と，その研究所に対する技術協力を日本政府に対して要請してきた。

研究所設立に係る無償資金協力については，既に実施設計が行われ建設が進行中である。技術協力事業に関しては昭和60(1985)年6月に事前調査団が派遣され，その要請内容と実施の可能性を確認し，さらに昭和61(1986)年2月には長期調査員を派遣し，日本側協力内容の説明と協議調整を行った。これら二つの調査結果を踏えて，日本政府は昭和61(1986)年7月22日から30日まで，国際協力事業団鉱工業開発協力部北村俊男部長を団長とする実施協議調査団をタイ国に派遣し，同国工業省関係者と協議した結果，技術協力内容について合意をみるに至ったので同調査団長とタイ工業省工業振興局長との間で討議議事録(Record of Discussions)に署名の交換を行った。討議議事録の署名により，1986年10月1日から1991年9月30日までの5年間にわたる本件プロジェクトの技術協力が開始されることになった。

本報告書は同調査団の現地における，討議議事録等についての折衝経緯，合意内容，協力暫定実施計画および調査結果をとりまとめたものである。併せて技術協力を開始するに至る経緯を理解する一助とするために，1986年2月に派遣した長期調査員チームによる調査結果を巻末にかかげた。

最後に本実施協議調査団の派遣に関し，ご協力いただいた関係省庁各位，本事業国内支援委員会委員各位，及び内外の関係機関の方々に深甚の謝意を表するとともに，あわせて今後のご支援をお願いする次第である。

昭和61年9月

国際協力事業団  
理事 古閑俊彦

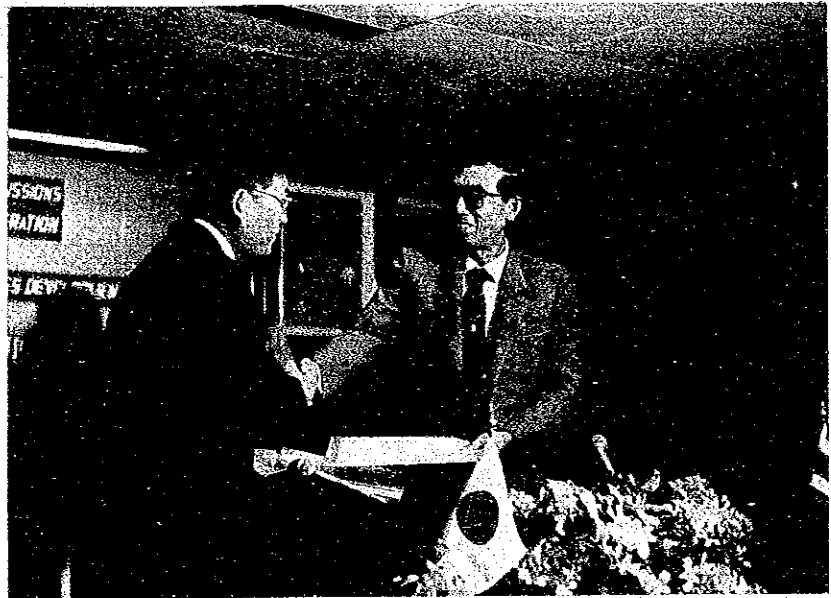




R/D 署名

北村 工業省工業振興局長  
 団長 Mr. Visith Noiphan

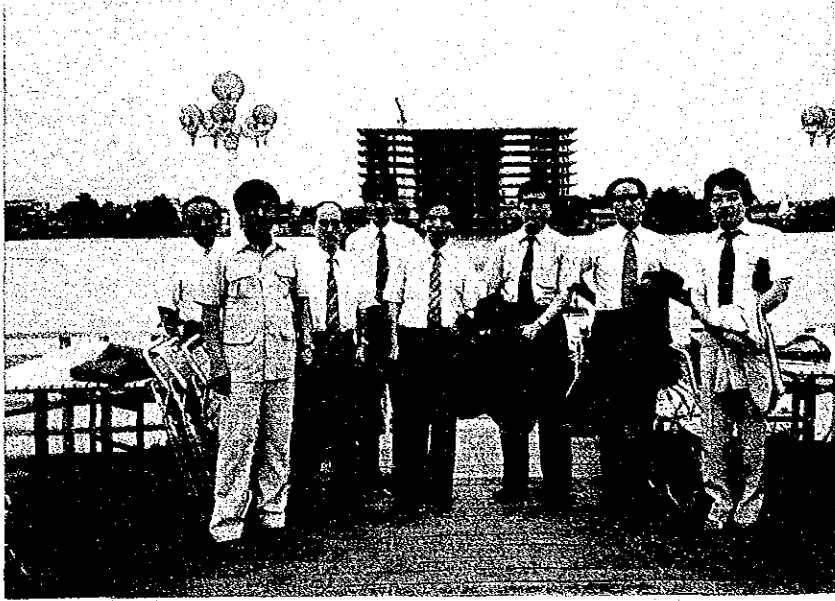
R/D 署名交換後の握手



R/D 署名交換後の団員  
 とタイ側関係者

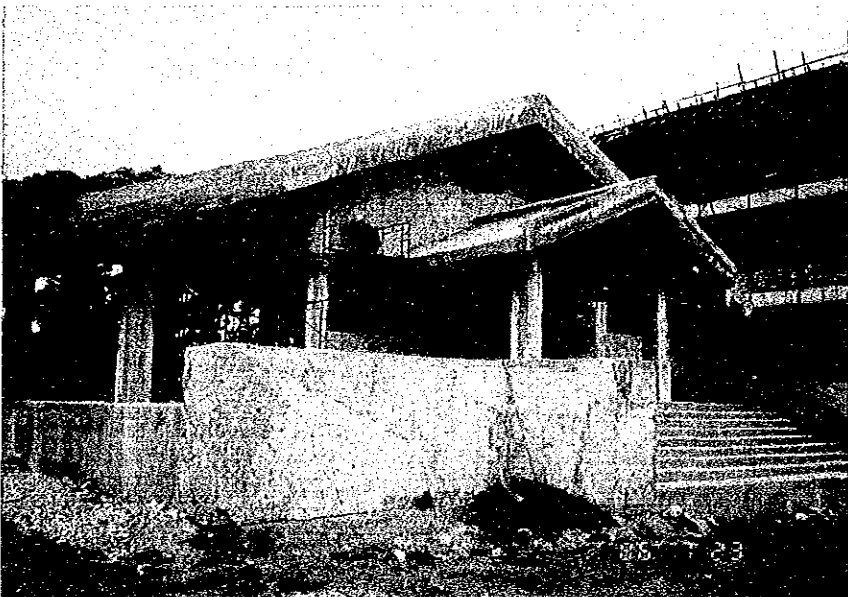
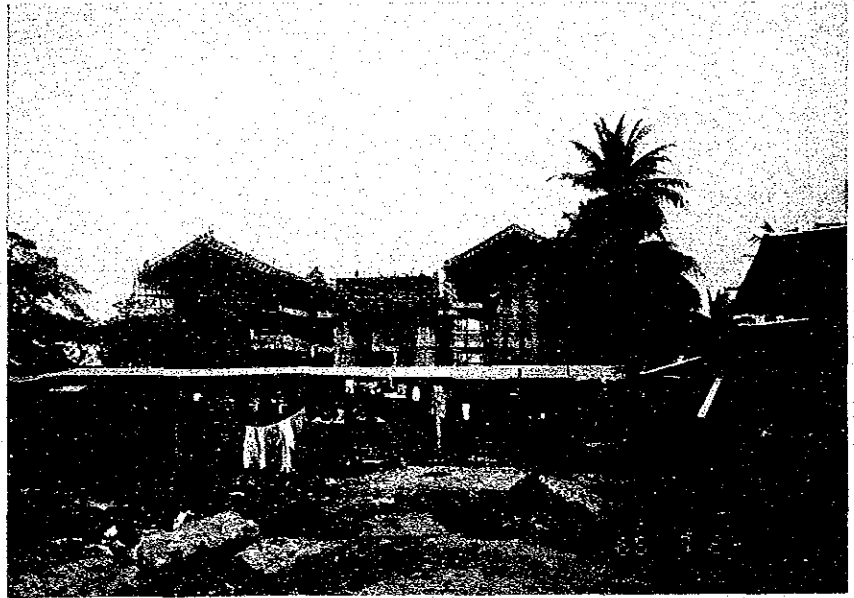






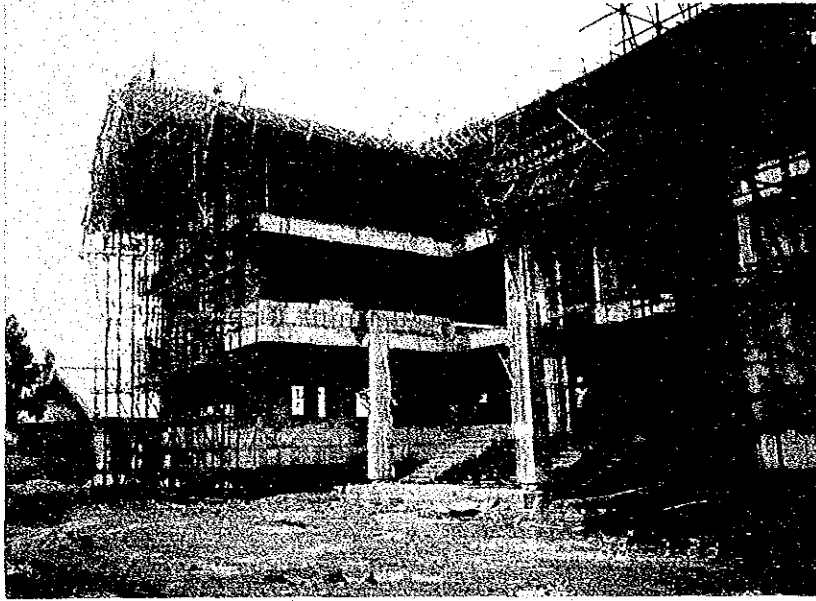
調査団員及び関係者  
(チャオプラーヤ川の河畔にて)

メインビルディング全景

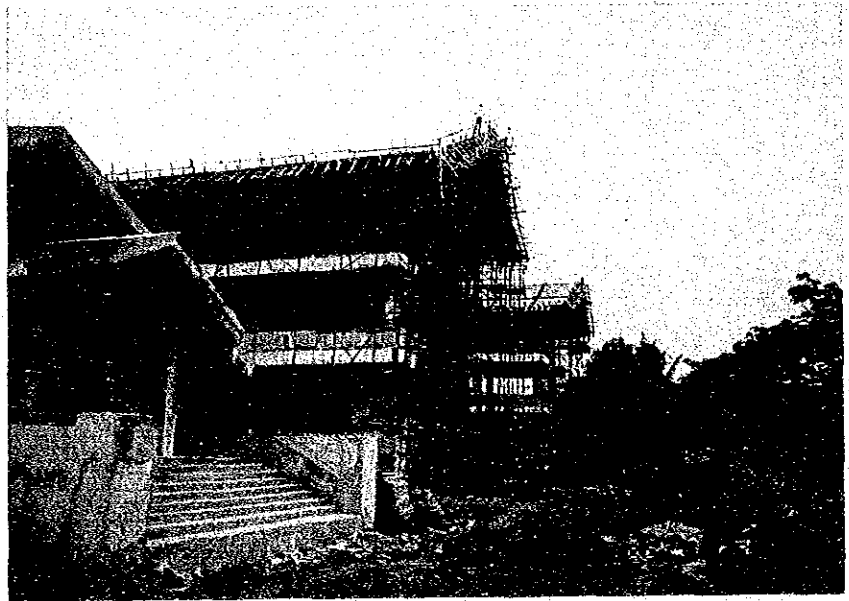


食 堂





MIDI建設現場  
——メインビルディング



手前は食堂、後方は  
メインビルディング



現地中小工場視察  
——傘工場





現地中小工場視察  
——仏像製作



現地中小工場視察  
——農業機械製作



現地中小工場視察  
——陶磁器製作



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# 1 実施協議調査団派遣

## 1.1 調査団派遣の経緯と目的

「タイ王国金属加工・機械工業開発研究所(MIDI)」に対するプロジェクト方式技術協力は1984年5月30日付公信によってタイ国政府から日本国政府に要請され、その内容については同年8月20日付公信に添付された"REQUEST FOR GRANT AID AND TECHNICAL ASSISTANCE PROJECT"に記載されている。日本国政府はこの要請を受け、1985年6月、事前調査団をタイ国に派遣し、要請の背景、目的、内容および当研究所の運営活動計画等について調査し、確認を行った。

その後、国内的には上記事前調査団の勧告を受け、関係各省と協議の結果、JICAの委託で財団法人素形材センターを事務局とする「タイ王国金属加工・機械工業開発研究所技術協力事業国内支援委員会」を設置し、タイ側の要請内容について検討を重ね日本側案を作成し、タイ側要請案と日本側案との比較、協議、調整を行うため、1986年2月から3月にかけて長期調査員チームを派遣した。

長期調査時における日本側案に対するタイ側の主な要望は次の通りであった。

- 1) 専門家派遣開始時期を日本が1986年10月としたのに対してタイ側は受入れ体制を整えて1987年2月～3月としたい。
- 2) 協力技術分野に鍛造を加え、鑄造技術として、非鉄合金鑄物とダイキャスト技術を、さらに工作機械設計の中にCAD/CAM技術を加えて欲しい。
- 3) 日本側長期専門家のうち、鑄造と熱処理分野の派遣期間を多少短縮し、タイ側研修生受入れ期間を延ばして欲しい。

長期調査員チームはこれらの要請を日本に持ち帰り、国内支援委員会において、派遣専門家候補者の意見も聴取しつつ検討した結果、派遣開始時期については無償援助で建設中の、一期工事完成(1986年12月)前に着任して工事内容を確認し、無償と技協との間にプランクを設けないことが望ましいとの考えから人数は若干減らしても1986年10～11月頃から派遣する。技術分野については、CAD/CAM技術を除いてはタイ側要望を受入れる方向とする。派遣期間と研修員受入れ期間については、タイ側カウンターパートの資質や技術協力内容などを考慮して検討した結果、日本側案とタイ側要望の折衷案的なものとする、などの結論を得た。これら検討結果を盛りこんで討議議事録(R/D)案、暫定実施スケジュールおよびその他の協議資料を作成した。日本国政府はこれらについて先方と協議を行ない相互の合意を得た上で、討議議事録に署名を行ないプロジェクト方式技術協力の枠組を決定するため、1986年7月22日から7月30日まで実施協議調査団を派遣した。

## 1.2 調査団の構成

担当分野	氏名	現職
団長	北村 俊男	国際協力事業団 鉦工業開発協力部長
技術移転計画	馬場崎 力	通商産業省機械情報産業局 鋳鍛造品課素材班長
訓練計画	黒岩 忠春	日本科学技術情報センター顧問
金属加工	日比野高三	(株)東芝鋳造品部 企画技術管理担当課長
機械加工	瀬戸 俊彦	石川島播磨重工(株) 海外事業本部技術部課長
業務調整	金城 誠一	国際協力事業団 鉦工業開発協力部開発技術課

## 1.3 調査日程

- (1) 7/22 (火) ○ 調査団 東京発 バンコク着
- (2) 7/23 (水) ○ JICA バンコク事務所および日本大使館表敬訪問  
○ DTEC ( Department of Technical and Economic Cooperation )  
表敬訪問  
○ DIP ( Department of Industrial Promotion ) および MOI  
( Ministry of Industry ) 表敬訪問  
○ 無償資金協力建設現場視察
- (3) 7/24 (木) ○ DIPにて協議
- (4) 7/25 (金) ○ DIPにて協議
- (5) 7/26 (土) ○ NIPC ( Northern Industrial Promotion Center in Chiang  
Mai ) 表敬訪問  
○ 小規模工場およびコティジインダストリー視察
- (6) 7/27 (日) ○ 資料整理
- (7) 7/28 (月) ○ DIPにて最終協議, 確認  
○ 署名用ドキュメント整理, 修正  
○ バンコク市内鋳物工場視察
- (8) 7/29 (火) ○ R/D署名, 交換, 関係先報告
- (9) 7/30 (水) ○ バンコク発 東京着

14 主要面談者

DTEC

Mr. Wanchai Sirirattana, Director General

Mr. Sutin Susila, Chief of Japan Sub-Division

Mr. Jiroj Itharatana, Staff

Mr. Surayuth Kungsadan, Staff

MOI

Mr. Chamnong Panatchutaboon, Deputy Permanent Secretary

DIP, MOI

Mr. Visith Noiphan, Director General

Mr. Ari Indhasorn, Deputy Director General

Planning Division, DIP

Mr. Padetpai Meekun-iam, Director

Mrs. Gunlapunha, Staff

Ms. Nitnirun, Staff

MIDI, DIP

Dr. Damuri Sukotang, Director

Mr. Virat Tandaechanurat, Chief of Workshop Sub-Division

Mr. Sivasakdi Boonyodm, Chief of Research and Development  
Group

Mr. Sombat Watanasap, Head of Educational System Development  
Section

Mr. Visuth PENCHMONGKOL, Head of Heat Treatment Section

Mr. Paiboon Chenpenungart, Head of Material Testing and  
Inspection Section

在タイ日本大使館

参事官 浦 部 和 好  
一等書記官 知 久 多喜真

JICA タイ事務所

所 長 後 藤 教 基  
所 員 四 釜 嘉 総

派遣専門家

MIDI, DIP 中 村 勝 治

SMI', Promotion and Finance, DIP 黒 田 朗

笠 島 修 治

タイ貿易研修センター

青 沼 浄

大 竹 正 治

## Ⅱ 要 約

日本側で作成し持参した前記技術協力実施計画案（マスタープラン、暫定実施スケジュール等）に基づき、タイ国工業省関係者と数回にわたり協議を行った。その結果、若干の変更はあったものの、我方案どおり大筋合意に達し、討議議事録（R/D）としてとりまとめ、調査団団長と工業振興局長との間で署名の交換を行った。主な合意事項は次の通りである。

(1) プロジェクト名は次の通りとする。

The Japanese Technical Cooperation Project on the Metalworking and Machinery Industries Development Institute.

(2) 協力期間

本プロジェクトの協力期間は、1986（昭和61）年10月1日から1991（昭和66）年9月30日までの5年間とする。

(3) 協力目的と内容

当研究所の活動範囲は非常に広いが、日本の技術協力は、当研究所の職員が、

① トレーニングコース・セミナーの開催、民間企業に対する巡回指導・コンサルティングサービス

② 民間企業に対する試験・検査および試作受託等の活動を実施するのに対して技術指導やアドバイスをしない自立できるようにする

のが目的であり、そのために日本は専門家の派遣、タイ国カウンターパートの日本での研修および機材の供与を行う。

また協力技術分野は次のとおりとする。

① Casting（鋳造）

② Heat treatment（熱処理）

③ Material testing and inspection（材料試験・検査）

④ Machining（機械加工）

⑤ Precise measuring and inspection（精密測定検査）

⑥ Machinery design（機械設計）

以上の6分野を主体として補足的に次の分野についても協力する。

① Educational and training system（教育訓練システム）

② Educational material and information system（教材作成と情報管理）

③ Welding and sheetmetal works（溶接・板金）

④ Electroplating（電気メッキ）

⑤ Managerial and control technology（管理技術）

⑥ Forging (鍛造)

(4) 専門家派遣

団長および調整員を加えた上記技術分野の専門家の数は次の通りである。

長期…… 9名

短期…… 約 23名

(5) タイ国カウンターパートの日本での研修

協力期間内に約 20名

(6) 供与機材

① 協議に基づき、必要と思われる機材・材料

② 機材・設備の予備品など

詳細については、次項参照

### Ⅲ 討議議事録等の交渉経緯

#### 3.1 交渉経緯

調査団とタイ国関係者との討議は工業省工業振興局において行われた。今回は事前調査および長期調査に次ぐ3回目の調査であることと、現在JICAからMIDIに派遣されている専門家を通じてある程度の非公式な情報交換をしていたこともあり、非常にスムーズに合意に達することができた。しかし討議の中でいくつかの質疑応答、意見確認および若干の変更があった。それらの主なものは次の通りである。

##### ① 討議議事録(R/D)の署名者について

日本側案では、調査団長と工業振興局長の署名の他に、日本側タイJICA事務所長とタイ国側DTEC局長とが“IN THE PRESENCE OF”という形式での署名を希望したがタイ国側DTECから“これまでに前例がない”とのクレームがあり、結局“WITNESS”の形でDTEC局長のみが署名することとなった。

(注：DTEC：Department of Technical and Economic Cooperationの略)

##### ② R/D ANNEX VII Joint Committeeのメンバーについて

Joint CommitteeのメンバーとしてDTECの代表も加えるようDTECから要請がなされ追加した。

##### ③ MIDIの組織図について

R/D ANNEX VIIの部課名についてShopをSectionに、Workshop DivisionをWorkshop Sub-divisionに変更するなど内容は変わらないが名称の変更があった。

##### ④ 暫定実施スケジュール(TIS)中のANNUAL WORK PLANの中でPlanningのタイ研修生のスケジュールが決定したので追記した。

##### ⑤ Scope of Technology Transfer (添付資料(3))

- ・ 鑄造技術の中にfurnacesのmaintenance technologyを要請されたので了承し追記した。
- ・ 機械加工技術の中で、機械類の精度チェック技術を要請されたが、これは当然案の中に含まれているものではあるが、強調する意味で追記した。
- ・ 工作機械設計の中で、CAD/CAMについて要請されたが断った。これは長期調査時にも要請されたもので、国内支援委員会で検討した結果協力対象から外したものである。

##### ⑥ 日本側からの要請で、視聴覚教育機材作成関係のスタッフとしてイラストレーターを一人追加することとなった。

##### ⑦ 日本の協力分野とMIDI組織との対応が明確でなかったのをこれを明確にして図示した(資料(5)参照)

その他MIDIの活動計画、カウンターパート配置計画および予算措置について、前回の調査に引きつづいて今回も再確認を行った。

- ⑧ カウンターパートについては、日本側が要請している最小限の人数はほぼ満足しており、1～2年間には十分な人数が配置されることが期待できる。
- ⑨ 運営予算についても、基本設計時にコンサルタントが試算したものと比較して、人数によって左右される人件費を除けば、ほとんど遜色がなく最低限の運営費は確保される見込みである。

以上の件は、工業省副次官(Deputy Permanent Secretary)を表敬訪問した際にも、本プロジェクトは工業省における重要プロジェクトとして位置づけられており、カウンターパートの配置および予算措置も優先的に実行していくことを確約した。(資料(8)参照)



3.2 討議議事録 ( R / D )

THE RECORD OF DISCUSSIONS  
BETWEEN THE JAPANESE IMPLEMENTATION SURVEY TEAM  
AND THE AUTHORITIES CONCERNED OF  
THE GOVERNMENT OF THE KINGDOM OF THAILAND  
ON THE JAPANESE TECHNICAL COOPERATION  
FOR THE METALWORKING AND MACHINERY INDUSTRIES  
DEVELOPMENT INSTITUTE

The Japanese Implementation Survey Team (hereinafter referred to as "the Team") organized by the Japan International Cooperation Agency (hereinafter referred to as "JICA") and headed by Mr. Toshio Kitamura visited the Kingdom of Thailand from July 22 to July 30, 1986 for the purpose of working out the details of the technical cooperation program concerning the Project on the Metalworking and Machinery Industries Development Institute in the Kingdom of Thailand.

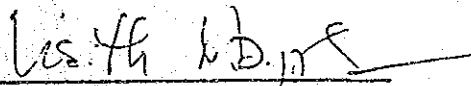
During its stay in the Kingdom of Thailand, the Team exchanged views and had a series of discussions with the Thai authorities concerned in respect to the effective measures to be taken by both Governments for the successful implementation of the above-mentioned project.

As a result of the discussions, both parties agreed to recommend to their respective Governments the matters referred to in the document attached hereto.

Bangkok, July 29, 1986

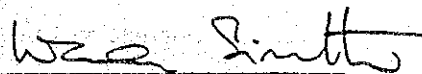


Mr. Toshio Kitamura  
Leader,  
Implementation Survey Team,  
Japan International  
Cooperation Agency, JICA  
JAPAN



Mr. Visith Noiphan  
Director General,  
Department of  
Industrial Promotion  
Ministry of Industry  
The Kingdom of Thailand

Witness:



Mr. Wanchai Sirirattana  
Director General,  
Department of Technical and  
Economic Cooperation  
The Kingdom of Thailand

## THE ATTACHED DOCUMENT

### I. COOPERATION BETWEEN BOTH GOVERNMENTS

1. The Government of Japan and the Government of the Kingdom of Thailand will cooperate with each other in implementing the Project on the Metalworking and Machinery Industries Development Institute (hereinafter referred to as "the Project") for the purpose of promoting the improvement of industrial technology and managerial techniques of the metalworking and machinery industries and thus contributing to the industrialization of the Kingdom of Thailand.

2. The Project will be implemented in accordance with the Master Plan which is given in ANNEX (I)

### II. DISPATCH OF JAPANESE EXPERTS

1. In accordance with the laws and regulations in force in Japan, the Government of Japan will take necessary measures through JICA to provide at its own expense services of the Japanese experts as listed in ANNEX (II) through the normal procedures under the Colombo Plan Technical Cooperation Scheme.

2. The Japanese experts referred to in 1 above and their families will be granted in the Kingdom of Thailand the privileges, exemptions and benefits no less favourable than those accorded to the experts and their families of third countries working in the Kingdom of Thailand under the Colombo Plan Technical Cooperation Scheme.

### III. PROVISION OF MACHINERY AND EQUIPMENT

1. In accordance with the laws and regulations in force in Japan, the Government of Japan will take necessary measures through JICA to provide at its own expense such machinery, equipment and other materials (hereinafter referred to as "the Equipment") necessary for the implementation of the Project as listed in ANNEX (III) through the normal procedures under the Colombo Plan Technical Cooperation Scheme.

2. The Equipment will become the property of the Government of the Kingdom of Thailand upon being delivered c.i.f. to the Thai authorities concerned at the ports and/or airports of disembarkation, and will be utilized exclusively for the implementation for the Project in consultation with the Japanese experts referred to in ANNEX (II).

#### IV. TRAINING OF THE PERSONNEL IN JAPAN

1. In accordance with the laws and regulations in force in Japan, the Government of Japan will take necessary measures through JICA to receive at its own expense Thai personnel connected with the Project for technical training in Japan through the normal procedures under the Colombo Plan Technical Cooperation Scheme. The procedures shall be carried out in coordination and consultation with Japanese experts as listed in ANNEX (II).

2. The Government of the Kingdom of Thailand will take necessary measures to ensure that the knowledge and experience acquired by the Thai personnel from technical training in Japan will be utilized effectively for the implementation of the Project.

#### V. SERVICES OF THE THAI COUNTERPART PERSONNEL AND ADMINISTRATIVE PERSONNEL

1. In accordance with the laws and regulations in force in the Kingdom of Thailand, the Government of the Kingdom of Thailand will take necessary measures to provide at its own expense the necessary services of the Thai counterpart personnel and administrative personnel as listed in ANNEX (IV).

2. The Government of the Kingdom of Thailand will allocate the necessary number of suitably qualified personnel corresponding to each Japanese expert to be dispatched by the Government of Japan as specified in ANNEX (II) for the effective and successful transfer of technology under the Project.

#### VI. MEASURES TO BE TAKEN BY THE GOVERNMENT OF THE KINGDOM OF THAILAND

1. In accordance with the laws and regulations in force in the Kingdom of Thailand, the Government of the Kingdom of Thailand will take necessary measures to provide at its own expense:

(1) Land, buildings and facilities as listed in ANNEX (V);

(2) Supply or replacement of machinery, equipment, instrument, vehicles, tools, spare parts and any other materials necessary for the implementation of the Project other than those provided through JICA under III above;

- (3) Transportation facilities and travel allowance for the official travel of Japanese experts within the Kingdom of Thailand;
  - (4) Suitably furnished accommodations for the Japanese experts and their families.
2. In accordance with the laws and regulations in force in the Kingdom of Thailand, the Government of the Kingdom of Thailand will take necessary measures to meet:
- (1) Expenses necessary for the transportation of the Equipment within the Kingdom of Thailand as well as for the installation, operation and maintenance thereof;
  - (2) Customs duties, internal taxes and any other charges, imposed on the Equipment in the Kingdom of Thailand;
  - (3) All running expenses necessary for the implementation of the Project.

#### VII. ADMINISTRATION OF THE PROJECT

1. The Director General of the Department of Industrial Promotion, Ministry of Industry, will assume overall responsibility for the implementation of the Project.
2. The Director of the Metalworking and Machinery Industries Development Institute, as the Head of the Project, will be responsible for the administrative, managerial and technical matters of the Project.
3. The Japanese Team Leader will provide necessary recommendation and advice on technical and administrative matters concerning the implementation of the Project to the Head of the Project and will provide suggestion to the Director General of the Department of Industrial Promotion, if necessary..
4. The Japanese experts will give necessary technical guidance and advice to Thai counterpart personnel on matters pertaining to the implementation of the Project.
5. For the effective and successful implementation of the Project, a Joint Committee will be established with the function and composition as referred to in ANNEX (VI.)

6. The organization chart for the implementation of the Project will be established as shown in ANNEX (VII).

#### VIII. CLAIMS AGAINST JAPANESE EXPERTS

The government of the Kingdom of Thailand will undertake to bear claims, if any arises, against the Japanese experts engaged in the Project resulting from, occurring in the course of, or otherwise connected with the discharge of their official functions in the Kingdom of Thailand except for those arising from the willful misconduct or gross negligence of the Japanese experts.

#### IX. MUTUAL CONSULTATION

There will be mutual consultation between the two Governments on any major issues arising from, or in connection with this Attached Document.

#### X. TERM OF COOPERATION

The duration of the Technical Cooperation for the Project under this Attached Document will be five (5) years from October 1st, 1986.

ANNEX (I) Master Plan

1. Objective of the Metalworking and Machinery Industries Development Institute.

The objective of the Metalworking and Machinery Industries Development Institute (hereinafter referred to as "the MIDI") is to support the improvement of industrial technology and managerial techniques, in particular, of small and medium scale industries which contribute to the industrialization of Thailand.

For the purpose of the above, the MIDI will undertake the following activities:

- (1) To hold seminars and training courses and to provide extension and consulting services to the private sectors in order to support and assist in technological and managerial improvement,
- (2) To provide services on testing, inspection and trial production for the private sectors,
- (3) To undertake research and development of appropriate technology to Thailand,
- (4) To play a role as a technical information center and as a center for coordination of cooperative activities among relevant organizations.

## 2. Objective of the Japanese Technical Cooperation

The objective of the Japanese Technical Cooperation is to provide the technical guidance and advice to Thai counterpart personnel in conducting their activities of the forementioned item (1) and (2) in Article 1 by means of the combination of dispatch of Japanese experts, training of Thai counterpart personnel in Japan and provision of equipment. Technological subjects to be cooperated are as follows:

### Main items

1. Casting
2. Heat treatment
3. Material Testing and Inspection
4. Machining
5. Precise Measuring and inspection
6. Machinery Design

### Sub-items

1. Educational and training system
2. Educational material and information system
3. Welding and sheetmetal works
4. Electroplating
5. Managerial and control technology
6. Forging

## ANNEX (II) Japanese Experts

1. Team Leader
2. Coordinator
3. Long-term experts in the fields of
  - o Casting
  - o Heat treatment
  - o Machining and Precise measuring
  - o Machinery design of Machine tool and Tool and die
4. Short-term experts in the fields of
  - o Educational materials and information system
  - o Material testing and inspection
  - o Welding and sheetmetal works
  - o Electro plating
  - o Managerial and control technology
  - o Machinery design, general
  - o Low cost automation
  - o Agricultural machinery design
  - o Pump and valve design
  - o Casting (Specific)
  - o Heat treatment (Specific)
  - o Machining and Precise measurement (specific)
  - o Forging

Note: Short-term experts for metalworking technology and for other subjects may be dispatched when necessity arises, for the smooth implementation of the Project.



### ANNEX (III) Equipment

The equipment necessary for implementation of the Project will be provided as follows:

1. Equipment and materials mutually agreed upon as necessary
2. Spare parts of machinery and equipment

Note: The decision of specification and selection of the above-mentioned equipment will be made in due course through mutual consultation.

ANNEX (IV) Thai Counterpart personnel and Administrative personnel

1. Head of the Project
2. Technical staff in the field of :
  - (1) Educational and training system
  - (2) Educational material and information system
  - (3) Casting
  - (4) Heat treatment
  - (5) Material testing and inspection
  - (6) Machining
  - (7) Precise measuring and inspection
  - (8) Welding and sheetmetal work
  - (9) Machinery maintenance and repair
  - (10) Electro plating
  - (11) Machinery design and engineering
  - (12) Managerial and Control technology
  - (13) Forging
3. Administrative staff
  - (1) Secretaries
  - (2) Accounters
  - (3) Clerks
  - (4) Typists
  - (5) Drivers
4. Other personnel mutually agreed upon as necessary, such as secretaries, typists and drivers for the Japanese experts.

## ANNEX (V) Land, Building and Facilities

### 1. Land

Sufficient space of land for the implementation of the Project.

### 2. Main Building

- (1) Director's room
- (2) Administration room
- (3) Teaching staff rooms
- (4) Chief advisor's room
- (5) Advisor's room
- (6) Seminar room
- (7) Lecture rooms
- (8) Meeting rooms
- (9) Testing and inspection room
- (10) Audio-visual room
- (11) Design room
- (12) Low-cost automation training room
- (13) Library
- (14) Others

### 3. Work Shops

- (1) Casting shop
- (2) Heat treatment shop
- (3) Machining shop
- (4) Welding and sheetmetal work shop
- (5) Electro plating shop
- (6) Wood pattern making shop
- (7) Sand testing room
- (8) Precise measurement room
- (9) Staff rooms
- (10) Others

4. Facilities

- (1) Canteen
- (2) Dormitory
- (3) Storage houses
- (4) Utility house
- (5) Parking spaces
- (6) Others

Note 1: The above buildings and facilities are to be provided under the grant aid of the Government of Japan.

2: Other facilities for the Institute should be provided by Thai side, if necessary.

## ANNEX (VI) Joint Committee

### 1. Functions

The Joint Committee meeting will be held at least once a year and whenever necessity arises.

- (1) To formulate the Annual Work Plan of the Project in line with the Tentative Schedule of Implementation formulated under the framework of this Record of Discussions;
- (2) To review the overall progress of the technical cooperation program as well as the achievements of the above-mentioned Annual Work Plan ;
- (3) To review and exchange views on major issues arising from or in connection with the technical cooperation program.
- (4) Other functions.

### 2. Composition

#### (1) Thai side

- Chairman, Director General of Department of Industrial Promotion
- Members • Director of MIDI
  - 2 or 3 members from relevant organizations designated by the chairman
  - 3 or 4 Thai counterparts designated by the chairman
  - Representative from Department of Technical and Economic Cooperation

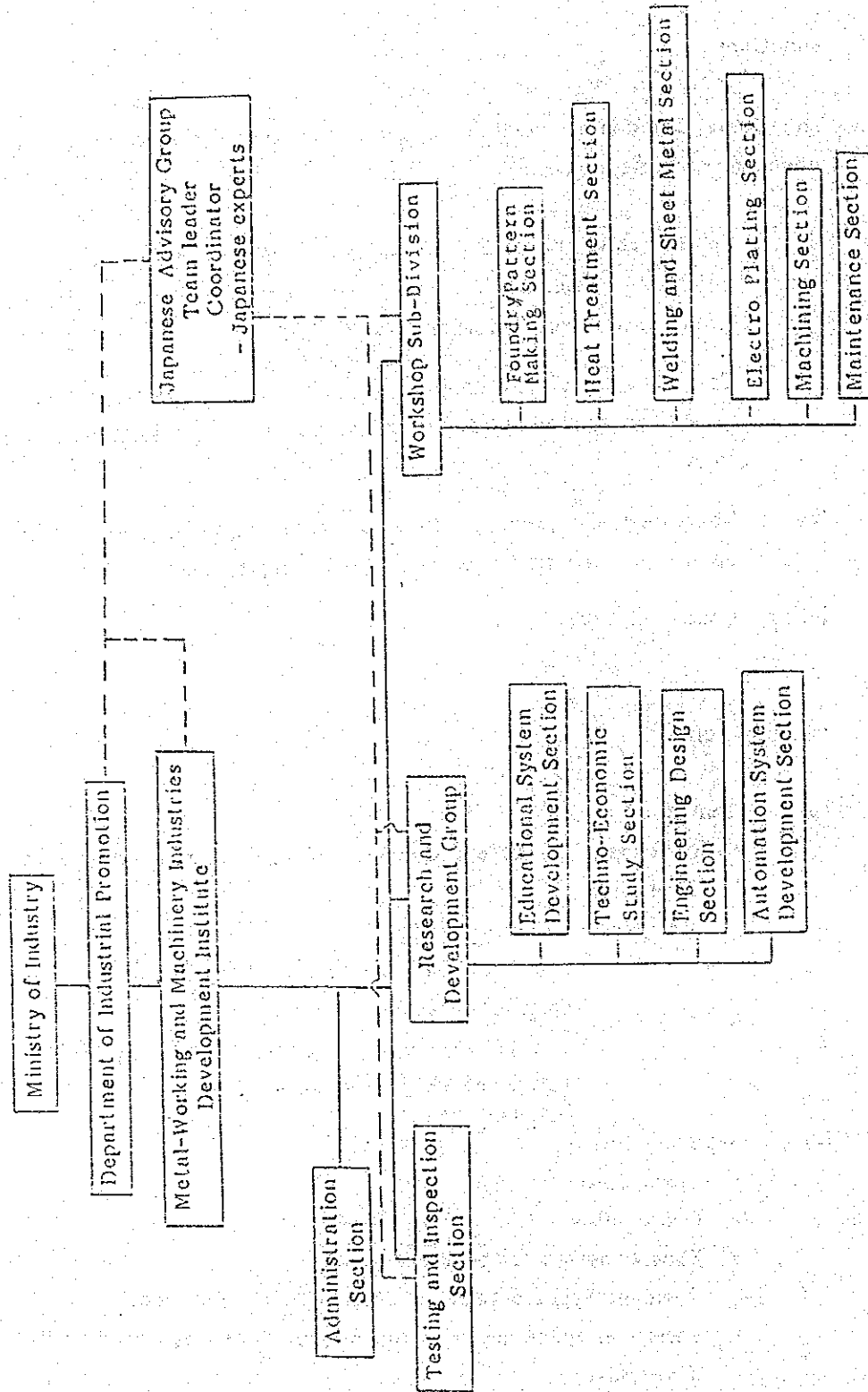
#### (2) Japanese side

- Team Leader
- Coordinator
- Experts designated by Team Leader
- Resident Representative of JICA Office in Thailand
- Personnel concerned with the Project to be dispatched by JICA, if necessary

NOTE : Official of the Embassy of Japan may attend the Joint Committee meeting as an observer.

Organization Chart of the Project

ANNEX (VII)




3.3 暫定実施計画書 ( T S I )


TENTATIVE SCHEDULE OF IMPLEMENTATION  
AND  
ANNUAL WORK PLAN FROM JULY 1986 TO DECEMBER 1987  
FOR  
THE METALWORKING AND MACHINERY INDUSTRIES  
DEVELOPMENT INSTITUTE IN THE KINGDOM OF THAILAND

The Japanese Implementation Survey Team and the representatives of the Department of Industrial promotion, Ministry of Industry have jointly formulated the Tentative Schedule of Implementation and the Annual Work Plan from July 1986 to December 1987 as annexed hereto.

These documents have been formulated in connection with Article I, Paragraph 2 of the Attached Document of the Record of Discussions signed between the Japanese Implementation Survey Team and the Department of Industrial Promotion, Ministry of Industry for the Technical Cooperation of the Metalworking and Machinery Industries Development Institute in the Kingdom of Thailand on condition that necessary budget will be allocated for the implementation of the Project, and are subject to change within the framework of the Record of Discussions when necessity arises in the course of implementation of the Project.

Bangkok, July 29, 1986

  
Mr. Toshio Kitamura  
Leader,  
Implementation Survey Team,  
Japan international Cooperation  
Agency, JAPAN

  
Mr. Visith Noiphan  
Director General,  
Department of  
Industrial Promotion,  
Ministry of Industry,  
Kingdom of Thailand

## I. TENTATIVE SCHEDULE OF IMPLEMENTATION

The technical cooperation period of five years will be phased in consideration of the situation and effectiveness of technology transfer.

### First Stage (Basic Establishment)

In this period, the equipment and educational materials for technology transfer will not entirely available, so that theoretical education and training will be mainly conducted.

### Second Stage (Development)

In this period, the equipment, facilities and Japanese experts will be almost available, so that the technical cooperation program will be intensively implemented.

Stage	Basic Establishment			Development		
	1986	1987	1988	1989	1990	1991
Calendar Year	1986	1987	1988	1989	1990	1991
Item	1 4 7 10	1 4 7 10	1 4 7 10	1 4 7 10	1 4 7 10	1 4 7 10
Grant Aid Project Phase I	→					
Phase II	←					
Term of Cooperation	←					
<u>Thai Side</u>						
Preparation of counterpart personnel and Administrative staff	←					
Allocation of operational budget for implementation	←					
Preparation and maintenance of necessary facilities for implementation	←					



Stage	Basic Establishment				Development											
	Calendar Year				Calendar Year											
	1986	1987	1988	1989	1990	1991	1991	1991								
Item	1	4	7	10	1	4	7	10	1	4	7	10	1	4	7	10
<b>Japanese Side</b>																
Long-term Survey Mission	1															
Implementation Survey Mission		1														
Mutual consultation team			1													
Technical guidance team						1				1						
Equipment repair team											1					
Evaluation team															1	
<b>Dispatch of Long-term Expert</b>																
• Team Leader																
• Coordinator																
• Casting Engineer																
• Technician																
• Heat Treatment																
• Machining Engineer																
• Technician																
• Machine Tool Design																
• Tool and Die design																
<b>Dispatch of Short-term Expert</b>																
• Information & A/V Production																
• Casting specific																
• Heat Treatment specific																
• Forging																
• Material Testing																
• Machining & Measuring																
• Machine Design & LCA																
• Managerial Technology																
• Welding & Sheetmetal																
• Electro Plating																

Stage	Basic Establishment			Development		
	1986	1987	1988	1989	1990	1991
Calendar Year	1986	1987	1988	1989	1990	1991
Item	1 4 7 10	1 4 7 10	1 4 7 10	1 4 7 10	1 4 7 10	1 4 7 10
Training of Thai Trainees in Japan						
Provision of Equipment						

- Note 1. This schedule is subject to conditions that necessary budget and counterpart personnel will be allocated for the implementation of the project.
2. Technological fields and periods of short-term experts and trainees will be finally decided in accordance with the consultation of the Joint Committee.
3. This schedule is subject to change within the scope of the Record of Discussion.

II. ANNUAL WORK PLAN FROM JULY 1986 TO DECEMBER 1987

	1986						1987												
	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12	1
<b>1. THAI SIDE</b>																			
(1) Preparation of office of Japanese experts																			
(2) Preparation of workshop																			
(3) Preparation for acceptance Japanese experts (A1, A2, A3, FORM)																			
(4) Staff recruitment																			
(5) Preparation for the training of counterpart																			
(6) Selection of equipment (A4 FORM)																			
<b>2. JAPANESE SIDE</b>																			
<b>(1) Dispatch of long-term experts</b>																			
a. Team Leader																			
b. Coordinator																			
c. Casting Engineer																			
d. Heat treatment Engi-																			
e. Machining Engineer																			
f. Machining Technician																			
<b>(2) Dispatch of short-term experts</b>																			
a. A/V production																			
b. Physical testing																			
c. Metallography																			
d. Mold & die production																			

	1986						1987												
	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12	1
e. Welding & sheetmetal																			
f. Machinery design, general																			
g. L.C.A.																			
(3) Training Thai Counterpart																			
a. Planning																			
b. Education system																			
c. Educational material																			
d. Non-destructive test																			
e. Metallography																			
f. NC machining																			
g. Gear machining and measuring																			
h. Machinery design																			
(4) Provision of Equipment																			

Note 1. This schedule is subject to conditions that necessary budget and counterpart personnel will be allocated for the implementation of the project.

2. Technological fields and periods of short-term experts and trainees will be finally decided in accordance with the consultation of the Joint Committee.

3. This schedule is subject to change within the scope of the Record of Discussion.

## Ⅳ プロジェクト実施上の留意点

本プロジェクトは、過去において日本国政府がJICAを通じて行ったこの分野での技術協力事業としては最大規模のものであり、このプロジェクトの効果的な実施が期待されている。

一方、タイ国側にとっても、国家社会経済開発計画の中で、中小金属加工・機械工業の発展は不可欠の要素であり、MIDIの貢献に期待するものは想像以上のものがある。このような背景を踏えて本プロジェクトを実施するにあたり次のような点に留意する必要がある。

### 4.1 実施体制

① MIDIは全く白紙の状態から設立されるわけではなく、約20年の歴史をもつIndustrial Service Division (ISD)から金属加工部門が発展的に分離独立するものであり、それぞれの技術分野で過去にも既に活動してきている。従ってカウンターパートの経験、資質もかなりのレベルにある。各専門家が移転する技術内容および方法は、それぞれのカウンターパートの経験・能力に合わせてフレキシブルに対応できるようなカリキュラムの準備が必要となる。また学校教育のように一律的な時間割による教育訓練は望めないで、カウンターパートの日常活動に合せた強弱をつけた技術移転が望まれる。とくに短期専門家については長期専門家がじっくりとカウンターパートを観察し協議合意の上でspecificな技術技能をもつ人を選び、期間なども相当にフレキシブルに考えていく必要がある。

② カウンターパートの日本での研修にあたっては、DTECにおいて相当に厳しい資格試験があり合格する必要がある。従って受入れ時期や研修分野につき、当初の計画の変更も予想される。

また金属加工・機械工業という技術分野の性格上、日本での研修機関は相当部分を民間企業に頼らざるを得ない。

③ 国内支援委員会および専門部会が、このプロジェクトに果たす役割は大きく、とくに研修員受入れに際しての日本での研修カリキュラム、研修機関の選定は非常に重要である。そのために派遣専門家との連絡を密にして、カウンターパートの経験、能力を十分に検討し、一律的な研修でなくターゲットを絞った研修が望まれる。日本における研修と現地における専門家により教育訓練とが有機的に咬みあうよう工夫すべきである。

### 4.2 実施計画

① 今回の実施協議において暫定実施スケジュールとスコープとが合意されたが、これを基本としてより具体的な技術移転カリキュラムを派遣専門家を中心に作成する必要がある。この場合に留意すべきは学校教育のように初級レベルから中級、上級へと、または、基礎

から実践、応用へと順序立てた時間割にのっとり教育訓練をするものでなく、MIDIの活動の中でOJTを主体とした技術を伝えていくことが通常の方法となる。従ってカリキュラムも固定的なものではなく、臨機応変に実践的な内容に添える内容とし、そのチャンスを探る教育ができるようなもの、又、重点的な濃淡のある内容とする必要がある。またMIDIの活動としてのトレーニングコースやセミナーなどとの整合性も考慮する必要があり非常に難しい面もあるが、それゆえなおさら、入念な準備が必要となる。

## ② 事業評価の方法について

この種のプロジェクトにおいては、プロジェクト評価の段階において相手国と評価が分かれ問題となることがあり、カリキュラム作成の段階で評価方法を念頭におく必要がある。カリキュラムは協力期間を考慮して無理のないものとして移転技術のターゲットに優先度をつけて、そのターゲットを詳細に項目化し、移転の度合を数量的に表現できるよう工夫することが望ましい。

## V その他特記すべき事項

- ① 本プロジェクトにおいては合計30名以上の長短期専門家が派遣されることになるが、専門家が携行する機材、とくに参考書、便覧、規格類等重複しないように、国内支援委員会などで統括し計画的に進める必要がある。
- ② 本プロジェクトは事前調査時点から数えれば6年間以上の長期にわたるものであり、その間に日本側の関係各省、JICAの関係者がほとんど変ってしまうことは十分に予測できる。その意味において本プロジェクトの後方支援機関である国内支援委員会委員はできるだけ変わることは避け、とくに事務局は継続的にフォローアップしていくことも重要であろう。





## VI 討 議 諸 資 料

- 資 料 - 1 TERMS OF REFERENCE
- " - 2 QUESTIONNAIRE
- " - 3 SCOPE OF TECHNOLOGY TRANSFER
- " - 4 COUNTERPART PERSONNEL AND ADMINISTRATIVE STAFF  
NECESSARY FOR JAPANESE TECHNICAL COOPERATION
- " - 5 COMPARISON OF MIDI ORGANIZATION & TECHNOLOGICAL ITEMS  
TO BE TRANSFERED
- " - 6 AN EXAMPLE OF CONTENTS OF TECHNOLOGY TRANSFER
- " - 7 PRESENT STATUS & TENTATIVE WORK PLAN OF MIDI  
(タイ側のMIDI活動状況と計画)
- " - 8 Welcome Address by Permanent Secretary of Ministry  
of Industry



TERM OF REFERENCE  
for the Implementation Survey  
on the Japanese Technical Cooperation  
for the Metalworking and Machinery  
Development Institute  
in the Kingdom of Thailand

The following issues will be discussed and agreed between the Japanese Implementaiton Survey Team and the Thai authorities concerned.

1. ATTACHED DOCUMENT of the RECORD of DISCUSSIONS
2. ANNEXES of the RECORD of DISCUSSIONS
  - ANNEX (I) Master Plan
  - (II) Japanese Experts
  - (III) Equipment
  - (IV) Thai Counterpart Personnel and Administrative Personnel
  - (V) Land Building and Facilities
  - (VI) Joint Committee
  - (VII) Organization Chart of the Project
3. TENTATIVE SCHEDULE OF IMPLEMENTATION
4. ANNUAL PLAN FROM JULY 1986 TO DECEMBER 1987

Furthermore, the following documents will be prepared by the TEAM for effective and smooth discussions.

Documents for the Discussion

- (1) Questionnaire
- (2) Scope of Technology Transfer
- (3) Technical Cooperation Program of the Project
- (4) Counterpart personnel and Administrative staff necessary for the Japanese Technical Cooperation
- (5) Comparison of MIDI's Organization and Technological items to be transfered
- (6) An example : GOAL of TECHNOLOGY TRANSFER

## QUESTIONNAIRE

The Team has some questions concerning MIDI's operations and would like to clarify them during this survey.

Q1. MIDI's Activity Plan

- a) Annual schedule in detail, in 1986 and 1987
- b) Five year plan from 1987 to 1991, if any
- c) What activities will be added to the existing ones after establishing MIDI and when will they be started?
- d) During construction of the work shops, how the existing training courses will be conducted?

Q2. Latest Staff Allocation Schedule

- a) Existing staff and its allocation to the sections or groups
- b) Recruitment plan of new staff

Q3. Reconfirmation of Possible Allocation of MIDI Budget

- a) Breakdown of the following items:

'Materials', 'Utilities expenses' and 'Miscellaneous'.

In particular, the team is concerned about small allocation to 'Miscellaneous'.

Q4. MIDI's Organization Chart

Which sections or groups will be responsible for the subjects of 'Managerial and Control' 'Educational Material and Information' and 'Forging'.

Q5. Questions from expert candidates

- a) Heat treatment : which technologies does the Thai counterpart request for Japanese expert to place emphasis on, practical, theoretical or trouble shooting?

b) Agricultural machinery design :

There are a great numbers of agricultural machines in the world. Which ones will an emphasis be placed on? Has Thai counterpart some request or not?

TECHNOLOGY FIELD		SCOPE OF TECHNOLOGY TRANSFER			REMARKS
Education/Training System Educational Material and Information System		BASIC TECHNOLOGY	PRACTICAL TECHNOLOGY	APPLIED TECHNOLOGY	
ELEMENTARY LEVEL	<ul style="list-style-type: none"> <li>General concept of education and training curriculum</li> </ul>	<ul style="list-style-type: none"> <li>Operation and maintenance of training and educational instrument</li> <li>Collection and systematization of education/training materials</li> <li>Operation of information equipment</li> <li>Data input to equipment</li> <li>Operation and maintenance of A/V equipment</li> </ul>			<p>1. Emphasis will be placed on LEVEL II of Basic Technology and LEVEL I and II of PRACTICAL TECHNOLOGY. However, more scopes other than the above-mentioned will be included as occasion demands.</p>
INTERMEDIATE LEVEL	<ul style="list-style-type: none"> <li>Significance of education and training</li> <li>Finding issues and problems on educational and training system</li> <li>Preparation of educational/training materials, software and hardware</li> <li>Measures for information and publication services</li> </ul>	<ul style="list-style-type: none"> <li>Bring-up of instructors for training courses and extension services in respective technological fields</li> <li>Implementation of the program</li> <li>Information data collection</li> <li>Application of micro computer software</li> <li>Dissemination of information</li> <li>Production technique of A/V educational material</li> </ul>	<ul style="list-style-type: none"> <li>Follow up system for graduated trainees</li> <li>Preparation of curriculum and program in each field of technology</li> </ul>		
ADVANCED LEVEL					

	BASIC TECHNOLOGY	PRACTICAL TECHNOLOGY	APPLIED TECHNOLOGY	REMARKS
ELEMENTARY LEVEL	<ul style="list-style-type: none"> <li>. Sorts and characters of metalworking processes</li> <li>. Sorts and properties of metal materials</li> <li>. Sorts and Properties of main mold materials</li> <li>. Sorts and properties of patterns</li> <li>. Management for safety in foundry</li> </ul>	<ul style="list-style-type: none"> <li>. Relevant technologies of materials and materials and processes</li> <li>. Characteristics of micro and macro metallographic structures</li> <li>. Constitution and mixing of mold materials</li> <li>. Maintenance technology of furnaces and equipment</li> </ul>	<ul style="list-style-type: none"> <li>. Present aspects and issues on Thai casting industry comparing to Japanese status quo.</li> </ul>	<p>1. Emphasis will be placed on LEVEL II of Basic Technology and LEVEL I and II of PRACTICAL TECHNOLOGY. However, more scopes other than the above-mentioned will be included as occasion demands.</p>
INTERMEDIATE LEVEL	<ul style="list-style-type: none"> <li>. Sorts and characters of casting process</li> <li>. Sorts and properties of metal materials for casting</li> <li>. Solidification characteristics of metals</li> <li>. Sorts and characters of molds</li> <li>. Fundamentals of melting techniques</li> <li>. Fundamentals of wooden pattern making</li> </ul>	<ul style="list-style-type: none"> <li>. Evaluation test of mixing and preparation in green sand and self-hardening moldings</li> <li>. Mixing and treatment of melting materials</li> <li>. Melting technique by cupola and induction furnace</li> <li>. Fundamentals of casting procedure</li> <li>. Prevention technique of defects</li> <li>. Pattern making</li> <li>. Non-ferrous casting</li> </ul>	<ul style="list-style-type: none"> <li>. Mechanization and layout of foundry shop</li> </ul>	
ADVANCED LEVEL	/	<ul style="list-style-type: none"> <li>. Surface reaction of metal and mold</li> <li>. Quality control of mold</li> <li>. Die casting.</li> </ul>	<ul style="list-style-type: none"> <li>. Basic analysis of solidification of cast iron</li> </ul>	

	BASIC TECHNOLOGY	PRACTICAL TECHNOLOGY	APPLIED TECHNOLOGY	REMARKS
ELEMENTARY LEVEL LEVEL I	<ul style="list-style-type: none"> <li>Safety measures in heat treatment shop</li> </ul>	<ul style="list-style-type: none"> <li>Type, structure, function and operation of heating furnaces and cooling equipment, including gas atmosphere furnace and salt bath furnace</li> <li>Material testing and inspection</li> <li>Microscopic analysis</li> <li>Pre-treatment and post-treatment</li> <li>Heat treatments by process normalizing, annealing, quenching tempering and flame hardening etc.</li> </ul>	/	<p>1. Emphasis will be placed on LEVEL II of basic technology and LEVEL I and II of PRACTICAL TECHNOLOGY. However, more scopes other than the above-mentioned will be included as occasion demands.</p>
INTERMEDIATE LEVEL LEVEL II	<ul style="list-style-type: none"> <li>Chemical composition and properties of metals</li> <li>Metallographic structure of steel</li> <li>Temperature measurement and automatic control</li> <li>Preventions against pollution</li> </ul>	<ul style="list-style-type: none"> <li>Heat treatments by material carbon steel, low alloy steel stainless steel, heat-resisting steel, high speed tool steel, spring steel, cast iron, cast steel and forged steel, etc.</li> <li>Gas atmosphere heat treatment gas generation and mixing control soft nitriding and gas carburising</li> <li>Control of salt mixtures against decarburising</li> <li>Flame hardening</li> </ul>	<ul style="list-style-type: none"> <li>Trouble shooting of the equipment</li> </ul>	
ADVANCED LEVEL LEVEL III	<ul style="list-style-type: none"> <li>Thermal transformation of steel in process of heating and cooling</li> </ul>	<ul style="list-style-type: none"> <li>Judgement of microscopic analysis and heat treatment</li> </ul>	<ul style="list-style-type: none"> <li>Defects in heat treatment and countermeasures.</li> <li>Design of components and preparation of heat treatment program</li> </ul>	



TECHNOLOGY FIELD: Material Testing and Inspection

SCOPE OF TECHNOLOGY TRANSFER

TECHNOLOGY FIELD	BASIC TECHNOLOGY	PRACTICAL TECHNOLOGY	APPLIED TECHNOLOGY	REMARKS
ELEMENTARY LEVEL	<ul style="list-style-type: none"> <li>Safe treatment of chemicals and reagents</li> <li>Technical terms and meanings</li> <li>Management for safety</li> </ul>	<ul style="list-style-type: none"> <li>Structure, mechanism and function of testing and inspection equipment</li> <li>Operation and maintenance of simple equipment</li> <li>Accuracy control equipment</li> </ul>	/	<p>1. Emphasis will be placed on LEVEL II of Basic Technology and LEVEL I and II of PRACTICAL TECHNOLOGY. However, more scopes other than the above-mentioned will be included as occasion demands.</p>
INTERMEDIATE LEVEL	<ul style="list-style-type: none"> <li>Mixing of etching and developing solution</li> <li>Technics for metallographic photo</li> <li>Knowledge of metallographic structure of superasonic inspection of magnetic particle inspection of Colour check of X-ray inspection</li> <li>Test and inspection regulations and standards of various kinds</li> <li>Planning of test and inspection</li> </ul>	<ul style="list-style-type: none"> <li>Operation and maintenance of complex and precise equipment</li> <li>Preparation of specimen</li> <li>Measurement of hardened layer and decarburised layer</li> <li>Sulphur printing</li> <li>X-ray inspection and photographing</li> <li>Judgement of test results</li> <li>Preparation of inspection record</li> </ul>	<ul style="list-style-type: none"> <li>Advice on drafting of Thai Industrial Standards on material testing and inspection</li> </ul>	
ADVANCED LEVEL	/	<ul style="list-style-type: none"> <li>Report making of test and inspection</li> <li>Repair of equipment</li> </ul>	<ul style="list-style-type: none"> <li>Investigation and reporting for failure problem</li> </ul>	

TECHNOLOGY FIELD Machining and Measuring SCOPE OF TECHNOLOGY TRANSFER 5

TECHNOLOGY FIELD	BASIC TECHNOLOGY	PRACTICAL TECHNOLOGY	APPLIED TECHNOLOGY	REMARKS
ELEMENTARY LEVEL LEVEL I	<ul style="list-style-type: none"> <li>Fundamental knowledge of machinery element</li> <li>Manual metalworking process (filling, chiseling, sawing, tapping etc.)</li> </ul>	<ul style="list-style-type: none"> <li>Introduction to mechanism</li> <li>Introduction to precision measuring</li> <li>Numerical controlled machine configurations - lathe</li> <li>Manual metalworking process                             <ul style="list-style-type: none"> <li>- scraping, scribing and lepping</li> </ul> </li> <li>Grinding of cutting tools                             <ul style="list-style-type: none"> <li>- drill, bit and endmill etc.</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>Process analysis</li> <li>Sequence control</li> </ul>	<ol style="list-style-type: none"> <li>Emphasis will be placed on LEVEL II of basic technology and LEVEL I and II of PRACTICAL TECHNOLOGY. However, more scopes other than the above-mentioned will be included as occasion demands.</li> </ol>
INTERMEDIATE LEVEL LEVEL II	<ul style="list-style-type: none"> <li>Principles of metal cutting and work shop method, (geometry of chip formation, cutting forces, machinability, surface finish, cutting temperature)</li> <li>Principles of metal materials (metallography, heat treatment, hardness cutting tool materials)</li> <li>Principles of grinding and work-shop method</li> <li>Conventional machine tools</li> </ul>	<ul style="list-style-type: none"> <li>Operation and maintenance of machine tools including accuracy check</li> <li>Manual NC programming</li> <li>Operation of measuring instruments</li> <li>Process analysis</li> <li>Design and manufacturing of jigs and fixtures</li> <li>Principles of electric discharge machining</li> </ul>	<ul style="list-style-type: none"> <li>Technology of automation</li> <li>Principle of group technology</li> <li>Trouble shooting</li> </ul>	
ADVANCED LEVEL LEVEL III	<ul style="list-style-type: none"> <li>Cutting and grinding theory</li> </ul>	<ul style="list-style-type: none"> <li>Programming of Machining center</li> <li>Programming of EDM and wire-cut EDM</li> </ul>	<ul style="list-style-type: none"> <li>Principle of super precision machining</li> </ul>	

TECHNOLOGY FIELD	BASIC TECHNOLOGY	PRACTICAL TECHNOLOGY	APPLIED TECHNOLOGY	REMARKS
ELEMENTARY LEVEL	<ul style="list-style-type: none"> <li>Drawing practice - General code                             <ul style="list-style-type: none"> <li>- Projection methods</li> <li>- Line conventions</li> <li>- Scales and</li> <li>- Dimensioning, etc.</li> </ul> </li> <li>Unit - International system of the Unit (SI) and comparison by country</li> <li>Drawing practice - ISO and comparative study of major standards</li> <li>Material symbols - Comparison of standards of main countries</li> </ul>	<ul style="list-style-type: none"> <li>Design and drafting (I)                             <ul style="list-style-type: none"> <li>shaft, key, screw thread, spring etc.</li> <li>Selection and application of basic machine elements</li> <li>bolt, nut, bearing, O-ring,</li> <li>oil seal, coupling, etc.</li> </ul> </li> <li>Sort and characteristics of prime mover</li> <li>Procedure and checking methods of design and drafting</li> <li>Maintenance of drawings and document</li> </ul>	/	<p>1. Emphasis will be placed on LEVEL II of Basic Technology and LEVEL I and II of PRACTICAL TECHNOLOGY. However, more scopes other than the above-mentioned will be included as occasion demands.</p>
INTERMEDIATE LEVEL	<ul style="list-style-type: none"> <li>Drawing practice - Indication of roughness</li> <li>- Presentation of views and section</li> <li>Materials and heat treatment</li> <li>Strength calculation of machine elements</li> <li>Fatigue strength and stress concentration</li> <li>Permissible strength and service factor</li> <li>Basic circuit of pneumatic and hydraulic control system</li> <li>Basic circuit of electric system</li> <li>Concept of standardization</li> </ul>	<ul style="list-style-type: none"> <li>Design and drafting (II)                             <ul style="list-style-type: none"> <li>Gears, Winch and Flywheel, etc.</li> <li>Welding design</li> <li>Casting design</li> </ul> </li> <li>Design considering production procedure</li> <li>Design of Lubrication system</li> <li>Mechanical efficiency and loss power</li> </ul>	<ul style="list-style-type: none"> <li>Design of speed reducer</li> <li>Design of pump and valve</li> <li>Design of agricultural machinery</li> <li>Design of mould and die</li> </ul>	
ADVANCED LEVEL	/	<ul style="list-style-type: none"> <li>Trouble shooting                             <ul style="list-style-type: none"> <li>gear, bearings and hydraulic machines, etc</li> </ul> </li> <li>Design for cost down</li> </ul>	<ul style="list-style-type: none"> <li>Design of simple machine tools</li> </ul>	

TECHNOLOGY FIELD

Machine Tool Design

SCOPE OF TECHNOLOGY TRANSFER

6-2

TECHNOLOGY FIELD	BASIC TECHNOLOGY	PRACTICAL TECHNOLOGY	APPLIED TECHNOLOGY	REMARKS
ELEMENTARY LEVEL	Fundamental calculation of the lathe Cutting theories Cutting speed Speed change ratio Main-bearing and its accuracy (plain, ball bearing) Screw cutting	Accuracy of main points Bed fabricated construction Surfacing of the bed carriage	Accuracy check of components 1. Accuracy of screw shaft 2. Straightness and flatness 3. Main bearing 4. Concentricity of main spindle and dead stock	1. Emphasis will be placed on LEVEL II or Basic Technology and LEVEL I and II of PRACTICAL TECHNOLOGY. However, more scopes other than the above-mentioned will be included as occasion demands.
INTERMEDIATE LEVEL	Detail design of components 1. Axle shaft 2. Main bearing 3. Main spindle change gears 4. Face plate with chucking device 5. Spindle box 6. Bed 7. Feed change box 8. Feed axle and apron 9. Tool saddle and carriage 10. Dead stock 11. Centur test		Special lathe 1. Turret lathe 2. Multi axis lathe 3. Cylinder boring 4. Gun drill 5. Program controlled lathe 6. No lathe	
ADVANCED LEVEL	Cutting tool	/	Auto loading, unloading mechanism Test cutting	

	BASIC TECHNOLOGY	PRACTICAL TECHNOLOGY	APPLIED TECHNOLOGY	REMARKS
ELEMENTARY LEVEL	<ul style="list-style-type: none"> <li>General knowledge for die design</li> <li>A sort of die and classification</li> <li>Plastic mould and sheetmetal stamping die</li> <li>Working for safety</li> </ul>	<ul style="list-style-type: none"> <li>Design and draft of die</li> <li>Design and manufacture of simple plastic die and sheetmetal press die</li> </ul>	<ul style="list-style-type: none"> <li>Present status and perspective of mould and die industry in Thailand</li> <li>Present status and perspective of mould and die industry in Europe, USA and Japan.</li> <li>Application of standard die set</li> </ul>	<p>1. Emphasis will be placed on LEVEL II of Basic Technology and LEVEL I and II of PRACTICAL TECHNOLOGY. However, more scopes other than the above-mentioned will be included as occasion demands.</p>
INTERMEDIATE LEVEL	<ul style="list-style-type: none"> <li>Die materials and heat-treatment</li> <li>Outline of press machine</li> <li>Significance of coolant water</li> </ul>	<ul style="list-style-type: none"> <li>Design and manufacture of various kinds of mould and die</li> <li>Die design and manufacturing considering production volume</li> <li>Design and production of plastic die</li> <li>Cost estimation of die</li> </ul>	<ul style="list-style-type: none"> <li>Precise measurement and accuracy control of die components</li> <li>Preparation of quality control standards and application</li> </ul>	
ADVANCED LEVEL	<ul style="list-style-type: none"> <li>Three axis transfer press</li> <li>Press timing curve</li> <li>Interference curve</li> </ul>	<ul style="list-style-type: none"> <li>Operation and maintenance of EDM and Wire-cut EDM</li> </ul>	/	

TECHNOLOGY FIELD: Welding and Sheetmetal work SCOPE OF TECHNOLOGY TRANSFER: 7

	BASIC TECHNOLOGY	PRACTICAL TECHNOLOGY	APPLIED TECHNOLOGY	REMARKS
ELEMENTARY LEVEL I	<ul style="list-style-type: none"> <li>Symbolic mark of welding</li> <li>Detail drawing and cutting plan</li> <li>Hand tools for welding process</li> <li>Gas cutting</li> <li>Sorts of welding process</li> <li>Welding electrodes</li> <li>Safety in welding</li> </ul>	<ul style="list-style-type: none"> <li>Plate processing</li> <li>- marking and gas cutting</li> <li>Gas welding</li> <li>Shielded metal-arc welding</li> <li>- Beading on plate</li> <li>- welding on flat position</li> <li>- welding on fillet weld</li> </ul>	<ul style="list-style-type: none"> <li>Presentation of welder qualification test in accordance with JIS</li> </ul>	<p>1. Emphasis will be placed on LEVEL II of Basic Technology and LEVEL I and II of PRACTICAL TECHNOLOGY. However, more scopes other than the above-mentioned will be included as occasion demands.</p>
INTERMEDIATE LEVEL II	<ul style="list-style-type: none"> <li>Drawing method of development</li> <li>Press and roll bending</li> <li>Correction of welding deformation</li> <li>Design of welding joint</li> <li>Selection of electrodes</li> <li>Procedure and equipment</li> <li>Preparation of welding procedure specification</li> <li>Preheating and post welding heat treatment</li> </ul>	<ul style="list-style-type: none"> <li>Technique on lofting</li> <li>Marking of subassembly</li> <li>Gas gauging</li> <li>Practice of press and roll bending</li> <li>Practice of               <ul style="list-style-type: none"> <li>- Shield metal arc welding, vertical and horizontal position</li> <li>- MIG and TIG welding</li> <li>- Arc air gauging</li> <li>- Brazing</li> <li>- Submerged arc welding</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>Repair for welding defect</li> <li>Planning of welding shop</li> </ul>	
ADVANCED LEVEL III	<ul style="list-style-type: none"> <li>Advise for study on welding engineering</li> </ul>	<ul style="list-style-type: none"> <li>Inspection of welding</li> <li>Mechanical test</li> </ul>		

TECHNOLOGY FIELD Electroplating SCOPE OF TECHNOLOGY TRANSFER 8

	BASIC TECHNOLOGY	PRACTICAL TECHNOLOGY	APPLIED TECHNOLOGY	REMARKS
ELEMENTARY LEVEL	<ul style="list-style-type: none"> <li>• Fundamentals of electroplating</li> <li>• Kinds of metal plating and feature</li> <li>• Fundamentals process of electroplating</li> </ul>	<ul style="list-style-type: none"> <li>• Hull cell test</li> <li>• pH test</li> <li>• Measurement of film thickness</li> <li>• Pin hole test</li> <li>• Wastewater inspection</li> <li>• Practice of surface treatment and cleaning</li> </ul>		<ul style="list-style-type: none"> <li>• Emphasis will be placed on LEVEL II of Basic Technology and LEVEL I and II of PRACTICAL TECHNOLOGY. However, more scopes other than the above-mentioned will be included as occasion demands.</li> </ul>
INTERMEDIATE LEVEL	<ul style="list-style-type: none"> <li>• Chemicals for electroplating</li> <li>• Outline of electroplating line</li> <li>• Principles of wastewater treatment</li> <li>• Thai regulation of wastewater pollution</li> </ul>	<ul style="list-style-type: none"> <li>• Practice of Cu Ni Cr plating</li> <li>• Practice of Zn plating</li> <li>• Practice of Hard chromium plating</li> <li>• Practice of Aluminium plating</li> </ul>	<ul style="list-style-type: none"> <li>• Design and layout of electroplating workshop</li> <li>• Outline of advanced technology for surface treatment rather than electroplating</li> </ul>	
ADVANCED LEVEL		<ul style="list-style-type: none"> <li>• Trouble shooting</li> </ul>		

TECHNOLOGY FIELD Managerial and Control Technology SCOPE OF TECHNOLOGY TRANSFER 9

TECHNOLOGY FIELD	BASIC TECHNOLOGY	PRACTICAL TECHNOLOGY	APPLIED TECHNOLOGY	REMARKS
ELEMENTARY LEVEL I	<ul style="list-style-type: none"> <li>. Production engineering</li> <li>. Mass production</li> <li>. Estimation of factory capacity</li> <li>. Balance of capacity and in-put</li> <li>. Process management and production Schedule</li> </ul>	<ul style="list-style-type: none"> <li>. Calculation of machining time</li> <li>. Confirm each kind of machining capacity</li> <li>. Planning daily schedul, and process analysis</li> <li>. Preparation of every job</li> </ul>	<ul style="list-style-type: none"> <li>. Machining standard</li> <li>. Operation sheets</li> <li>. Control by process panels and charts</li> <li>. Maintenance of machine</li> <li>. Ratio of automation</li> </ul>	<p>1. Emphasis will be placed on LEVEL II of Basic Technology and LEVEL I and II of PRACTICAL TECHNOLOGY. However, more scopes other than the above-mentioned will be included as occasion demands.</p>
INTERMEDIATE LEVEL II	<ul style="list-style-type: none"> <li>. Planning main production schedule</li> <li>. Machinetics layout planning</li> <li>. Factory managing organization and pursue team</li> </ul>	<ul style="list-style-type: none"> <li>. Daily job progress &amp; record</li> <li>. Cost estimation and result</li> <li>. Tool design and improvement</li> <li>. Check of machining capacity</li> <li>. Timing of material supply</li> </ul>	<ul style="list-style-type: none"> <li>. Equipment improvement</li> <li>. Process improvement</li> <li>. Factory planning</li> <li>. Group technology</li> </ul>	
ADVANCED LEVEL III	<ul style="list-style-type: none"> <li>. Process management system</li> </ul>	<ul style="list-style-type: none"> <li>. Cost control and analysis</li> <li>. Improve parts flow by machinerics layout</li> <li>. Productivity</li> </ul>	/	



TECHNOLOGY FIELD

Forging

SCOPE OF TECHNOLOGY TRANSFER

10

TECHNOLOGY FIELD	BASIC TECHNOLOGY	PRACTICAL TECHNOLOGY	APPLIED TECHNOLOGY	REMARKS
ELEMENTARY LEVEL I	<ul style="list-style-type: none"> <li>Definition and feature of forging</li> <li>Process flow from raw material to ex-works</li> <li>Kinds of forging and their feature</li> </ul>	<ul style="list-style-type: none"> <li>Cutting of material</li> <li>Operation of heating furnace</li> <li>Safety management</li> </ul>	/	<p>1. Emphasis will be placed on LEVEL II of Basic Technology and LEVEL I and II of PRACTICAL TECHNOLOGY. However, more scopes other than the above-mentioned will be included as occasion demands.</p>
INTERMEDIATE LEVEL II	<ul style="list-style-type: none"> <li>Mechanism of plasticity in forging</li> <li>Metallurgy in forging</li> <li>Materials for forging and application</li> <li>Generals on forging equipment</li> </ul>	<ul style="list-style-type: none"> <li>Fundamentals and practice of free forgings</li> <li>Fundamentals and practice of die forging including die design and die production</li> <li>Heat treatment of forgings</li> <li>Test and inspection of forgings</li> <li>Design of jigs and tools</li> </ul>	<ul style="list-style-type: none"> <li>Design and layout of forging shop</li> <li>Vibration and noise from forging machines and its countermeasure</li> </ul>	
ADVANCED LEVEL III	/	<ul style="list-style-type: none"> <li>Maintenance of facilities</li> <li>Lubrication control</li> </ul>	/	

COUNTERPART PERSONNEL AND ADMINISTRATIVE STAFF  
NECESSARY FOR JAPANESE TECHNICAL COOPERATION

	1986	1987	1988	1989	1990	1991
1. Education and training system	1	1				
2. A/V material production and information system including library staff	1	1	1	1	1	1
3. Casting		1	1	1	1	1
4. Heat treatment		1	1	1	1	1
5. Material testing and inspection	1	1	1	1	1	1

- continued -

	1986	1987	1988	1989	1990	1991
6. Welding and sheetmetal works		┌				
7. Machining and precise measuring	┌	┌				
8. Electroplating		┌				
9. Forging				┌		
10. Maintenance and Repair	┌	┌				

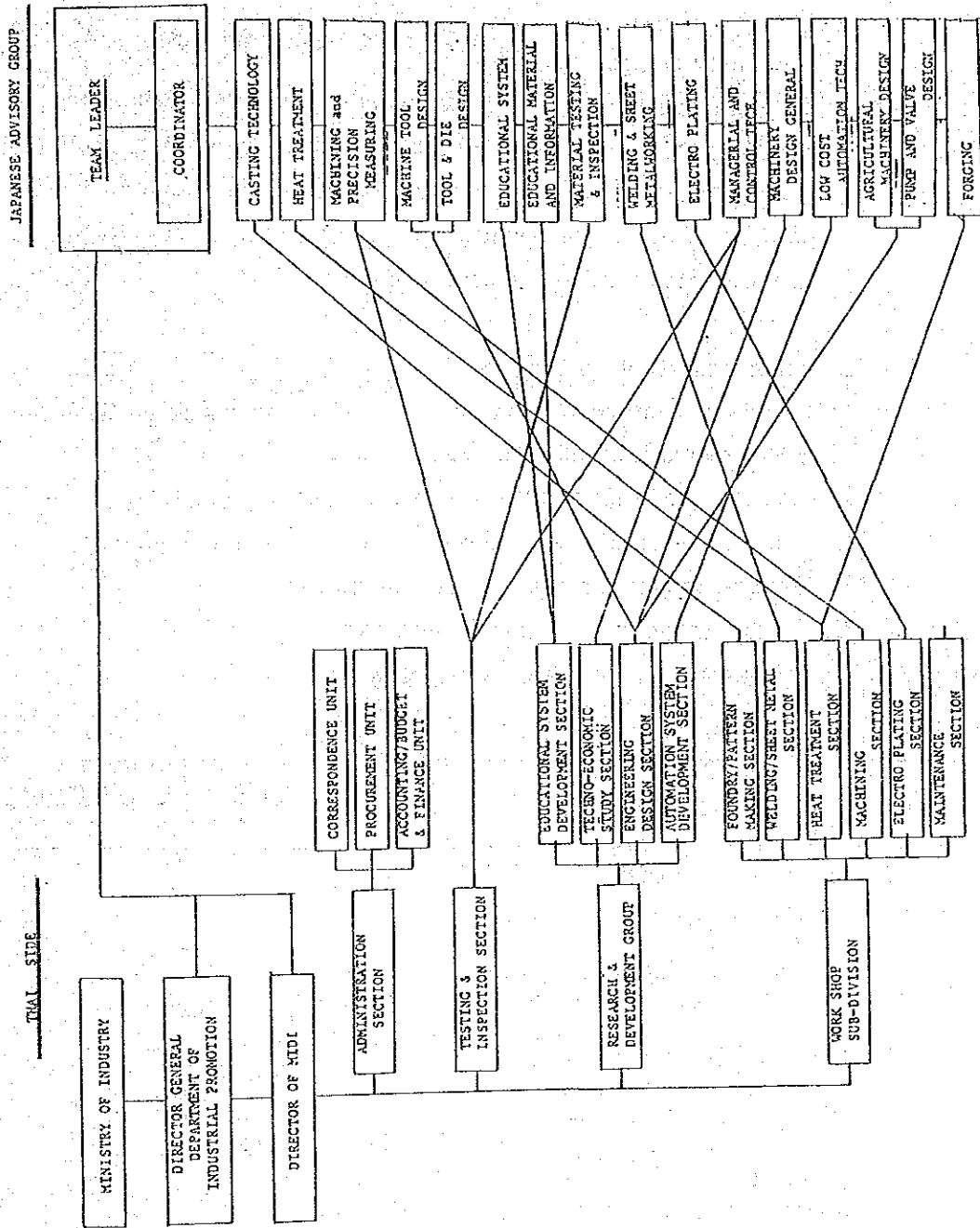
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	1986	1987	1988	1989	1990	1991
11. Machinery design including L.C.A.						
12. Managerial and control						
13. Administrative Staff for Japanese experts						
Secretary (Typist)						
Drivers						
Miscellaneous Job						

Note 1. ———— Counterpart to be trained  
 - - - - - Assistant workers and Administ staff

2. The above shows minimum necessary counterparts and staff for the Technical Cooperation. It is desirable to allocate plurt counterparts to each Japanese expert, if possible. More staff will be necessary for MID's actively itself.

COMPARISON OF NIDI ORGANIZATION & TECHNOLOGICAL ITEMS TO BE TRANSFERRED



An example of  
 CONTENTS OF TECHNOLOGY TRANSFER

Subject : Machinery Design, General

To train counterpart personnel to have fundamental knowledges and practical abilities on basic machinery design, which can be applied to more advanced designs of various machines and equipment. For the purpose of that, the counter part personnel will be trained in the following items during the cooperation period:

1. Fundamentals of drafting method,
2. Knowledge and application of the International Standards comparing some standards of industrialized countries,
3. Materials and heat treatment of basic machine elements,
4. Strength calculation and selection of basic machine elements,
5. Design and drafting of basic machine elements,
6. Trouble shooting of machinery elements,
7. Management of design and drafting work.

Training Items	Training Period (month)									
	1	2	3	4	5	6	7	8	9	10
1. Fundamentals of drafting										
• General principles, projection, lines and scale										
• Tolerances, fitting and roughness										
• Indication on drawings, etc.										
2. International Standards and major standards of some countries										
• ISO standards comparing to other countries' standards										
• SI system										
• Material symbols, etc.										
3. Fundamentals of strength, materials and heat treatment of basic machine elements										
• Strength calculation										
• Permissible stress, safety factor and service factor, etc.										
• Fatigue strength and stress concentration										
• Materials and heat treatment										



資料一 7

Present Status & Tentative Work Plan  
of  
The Metal-Working and Machinery Industries Development  
Institute

Present to  
the Implementation Survey Team  
of JICA

July 1986



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## The Metalworking & Machinery Industries Development Institute (MIDI)

### A. Present Status of MIDI

Since October 4, 1985, the project on the establishment of the Metalworking & Machinery Industries Development Institute (MIDI) of the Department of Industrial Promotion has been materialized. This is because of the assistance provided by the Japanese Government. Further more, the MIDI project was approved by the Cabinet of the Thai Government on December 3, 1985.

The main goal of MIDI is to restructure the engineering industry for higher production efficiency with emphasis on improving and development technologies for small and medium scale metalworking and machinery industries both in central and regional areas. Therefore, the main objective of MIDI is to support the upgrading of industrial technology and managerial techniques of these industries.

MIDI will undertake the following activities :

- (1) To hold seminars and training courses and to provide extension and consulting services to the private sectors in order to support and assist in technological and managerial improvement,
- (2) To provide services on testing, inspection and trial production,
- (3) To undertake research and development of technology appropriate to Thailand,
- (4) To play a role as technical information center and a center for coordination in the field of metal-working industries.

At present, the administrative and canteen buildings of the MIDI are under construction. It is expected that these buildings, equipped with equipments, will be finished by the end of 1986. It is also expected that the buildings of workshops and dormitory will start construction in August 1986.

The Director General (DG) of the Department of Industrial Promotion (DIP) has given an order No. 30/2529 on March 10, 1986 to upgrade MIDI to the same level as ISD. The Director of MIDI is, therefore, reported directly to DG of DIP.

The Organization of MIDI is as attached figure 1. MIDI is divided into 2 Sections 1 Group and 1 Division, of which their functions are as follows;

## I. Administration Section

- . Adjustment and management of general schedules and budget of the institute
- . Future planning and adjustment
- . Personnel planning and control
- . Interchanging contact to other organizations concerned
- . Advertisement and dissemination of all information of the institute
- . Other general affairs, etc.

## II. Testing and Inspection Section

- . Providing testing services to private sector
- . Coordinating with TISI in drafting industrial standards
- . Assisting TISI in testing & inspection of metal working Products
- . Training quality control personnels in private sector in testing and inspection techniques
- . Providing extension services in the field of testing & inspection and quality control.

## III. Research and Development Group

### Educational System Development Section

- . Curricula planning and execution of seminars and training courses
- . Control and procurement of lecturers and instructors

- . Planning and editing of educational materials
- . Study and translation of technical papers and reports etc.
- . Managing of library and audio-visual education system
- . Publication of bulletines, technical information etc.
- . General planning scheduling of seminars, trainings and extension (rounding) services
- . Acceptance of seminars, training and entrusted jobs

#### Techno-Economic Section

- . Undertaking techno-economic survey to several specific metal-working & machinery manufacturing group
- . Analysing the situation of each specific industrial group
- . Writing and disseminating techno-economic report to both governmental and private sectors
- . Advice and assisting the Workshop Division of MIDI in undertaking research and development activities appropriate to local needs
- . Drafting and proposal of specific industrial development plan and policy to organization concerned
- . Providing extension services in the field of management and general affair to small and medium metalworking manufacturers

#### Engineering Design Section

- . Undertaking research and development activities in the field of engineering design
- . Designing parts, machinery and equipment of target products

- Drawing of parts and machinery
- Dissemination of detail drawings of parts and machinery which has been successfully developed to private sector and interested parties
- Advice and assisting the Workshop Division of MIDI in the development and trial production activities as well as in testing of developed products
- Training and instructing of trainees in the field of engineering drawing

Automation System Development Section

- Undertaking research and development activities in the field of automation system appropriate to small and medium scale industry
- Training and instructing of trainees in the field of automation techniques
- Working with the Engineering Design Section in designing of automation system of specific part and machinery
- Advice and assisting the Workshop Division of MIDI in the development and trial production activities
- Instruction of extension services in the field of automation system
- Study and translation of technical papers and texts in the field of automation system

#### IV. Workshop Division

The Workshop Division of MIDI is divided into 6 sections, namely, Casting Shop, Heat Treatment Shop, Welding and Sheet metal Shop, Plating Shop, Machining Shop and Maintenance Section. The functions of each section are more or less the same. The difference is only on the field of operation and the Maintenance Section has to play the supporting function of the Division. The functions of these sections are as follows :-

- Training and instructing of trainees
- Production of entrusted jobs
- Development and trial production of jigs and fixtures
- Trial production and testing of developed products
- Maintenance of facilities and equipment
- Instruction of extension services
- Introduction plans of facilities and equipment
- Scheduling of facilities and control etc.
- Cooperation with the Research and Development Group in the fields of educational system development, techno-economic study, engineering design and automation system development

## B. MIDI's Activity Plan

The activities of MIDI, which has been stated in item I., can be itemized as follows :-

- 1) Conduct training courses both in theoretical and practical training in the fields of :-
  - Casting
  - Machining
  - Welding and Sheetmetal-work
  - Heat Treatment
  - Low-cost automation
  - Forging
  - Plating
  - Presswork
  - Engineering Drawing
  - Testing and Inspection
  - Managerial Techniques
  - Quality Control
  - Production Control
- 2) Hold seminar, conference, symposium etc. in the field of metal-working technology and related field, i.e metal-working and machinery industries development field.
- 3) Provide testing and inspection services in the fields of :-
  - Precision Measurement
  - Metallography



- Physical (Mechanical) Test
  - Non-Destructure Test
- 4) Provide extension and consulting services to small and medium metal-working and machinery industries both in metropolitan and provincial areas.
  - 5) Support and assist small and medium scale metal-working by provision of entrusted jobs service and trial production
  - 6) Provide information and educational services <sup>through</sup> there :-
    - Audio - Visual
    - Publication of texts, technical information, etc.
    - Query and Answers Service
    - Library Service
  - 7) Provide engineering design service
  - 8) Undertake research and development activities appropriate to local needs
  - 9) Undertake techno-economic study
  - 10) Coordinate with organization concerned both in public and private sectors in the field of metal-working and machinery industries

It can be stated that the activities of MIDI will be expanded from the existing ones. The activities which has been added are those activities of the Testing and Inspection Section, of the Research and Development Group and the entrusted jobs and trial production activities of the Workshop Division.

Since January 1986, the MIDI Phase I has been under construction, therefore, most of the activities undertaken in 1986 are in training and provision of extension services to small and medium scale metal-working industries. The construction of MIDI's main building and canteen will be finished early next year. It is planned that the activities in the fields of testing and inspection service, information and educational service, engineering design service and techno-economic study will be added. The annual schedules in detail in 1986 and 1987 are shown in Table 1 and 2.

During construction of the Workshops, the training courses will be conducted by using the existing equipments and machinery at ISD workshop for demonstration. There will be no practical training courses conducted except in the field of automation.

C. Staff Allocation

At present, the total number of MIDI's staff is 50, in which 33 of them are civil service officers and 17 permanent contracted staffs. The allocation of these staffs is shown in Table 3.

In the fiscal year of 1987, there will be 20 new staffs allocated to MIDI. They are 14 civil service officers and 6 permanent contracted staffs. The recruitment plan of these new staffs is in January 1987. This is because of the timing of the budget allocation of the Budget Bureau Office.

As shown in Table 3, the allocation of MIDI staff is in the period of 3 years, 1986-1988. This is because of the staff planning done by the Civil Service Officer Commission Office and the Budget Bureau Office.

D. Allocation of MIDI Budget

The allocation of MIDI Budget in the Fiscal Year of 1986 is Baht : 2,801,600, in which approximately 2.5 million Baht is salaries and wages and the utility of MIDI Project's office is paid by ISD budget. The allocation in the Fiscal Year of 1987 is Baht : 5,226,500. Breakdown of 1987 budget and the possible allocation of MIDI Budget in 1988 - 1991 is shown in Table 4.



List of Appendices

MIDI. WORK PLAN AND ACTIVITIES

fiscal year 1986 (October 1985 - September 1986)

Table 1

Activities	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	Jun.	Jul.	Aug.	Sept.	Remarks
1. Training Activities													
1.1 Bangkok Area													
Precious Metal Plating													
Electroplating Technique													
Anodizing													
Metallic Plating on Plastic													
Blackening													
Pneumatic in LCA (part I)													
Pneumatic in LCA (Part II)													
Heat Treatment Technology													
Martempering													
Welding Technology													
Tig & Mig Welding Technology													
Welding Jig & Fixture													
Welding for Maintenance													
Foundry Technology													
Centrifugal Casting Technique													
Waste Water treatment in Plating Shop													
Engineering Drawing													
1.2 Provincial Area													
Plating Technology													
Heat Treatment & Welding													
Foundry Technology													
Low Cost Automation													

Appendix I

Mahasarakam  
Khon-Kaen  
Song-Khia

**MIDI. WORK PLAN AND ACTIVITIES**  
 fiscal year 1986 (October 1985 - September 1986)

Activities	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	Jun.	Jul.	Aug.	Sept.	Remarks
1.3 Special Training & Semina													
Cooperated with other Institutions													
Cooperated with private sector													
2. Extension & Consultancy Services Activities													
2.1 Firm-by-firm basis extension service													
Plating Shop													
Foundry Shop													
Machining Shop													
Heat Treatment & Welding													
LCA Technique													
2.2 Consultancy Service													
Give any advice to the entrepreneurs related to the metalworking technology													
2.3 General extension Service													
Surface Finishing Service													
Welding Service													
Machining Service													
Foundry Service													
General Problem Solving Service													

Can be organised during the year

# MIDI. WORK PLAN AND ACTIVITIES

fiscal year 1986 (October 1985 - September 1986)

	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	Jun.	Jul.	Aug.	Sept.		
<b>Activities</b>  <u>3. Investigation &amp; Experimentation Activities</u> - Small Hot Bath for heat treatment - Press dies - Paper cutting M/C - Non ferrous Casting - Centrifugal Casting Process by using rubber model - Material catching arm operated by pneumatic													Remarks  To be used for training in the provincial area  (brass alloy) - Preparation for training	
<u>4. Technical Information Activities</u> 4.1 Provision of Information  4.2 Information Service														



MIDI - ACTIVITIES

During the fiscal year 1986 (October '85-September '86)

No.	Course	No. of course	Period per course (Days)	No. of Participants		Remark
				per courses	total	
<u>1. Training &amp; Seminar Activities</u>						
I.1 Bangkok area						
1	Precious Metal Plating	3	2	35	105	
2	Electro Plating Technigue	3	3	35	105	
3	Anodizing	1	2	25	25	
4	Metallic Plating on Plastic	1	3	20	20	
5	Blackening	-	-	-	-	
6	Pneumatic in LCA (part I)	1	5	20	20	
7	Pneumatic in LCA (part II)	1	4	13	13	
8	Heat Treatment Technology	4	4/5	25	60	
9	Martempering	1	4	20	20	
10	Welding Technology	-	-	-	-	
11	Tig & Mig Welding Technology	3	3	30	90	
12	Welding Jig & Fixture	-	-	-	-	
13	Welding for Maintenance	2	4	35	70	
14	Foundry Technology	-	-	-	-	
15	Centrifugal Casting Technique	2	5	25	50	
16	Waste Water Treatment in Plating Shop	1	2	30	30	
Sub - Total					608	

Course	No. of course	Period per course (Days)	No. of Participants		Remark
			per courses	total	
1.2 Provincial Area					
Welding Technology	1	2	73	73	Khon-Kaen
Principle of Plating on Conductive and Nonconductive Materials	1	2	46	46	Maharakarm
Low Cost Automation	1	5	30	30	Song-Khla
Sub-Total				149	
1.3 Special Training & Seminar Course					
Engineering Drawing	1	5	30	30	Staffs-Lion Co.,Ltd.
Welding Technigue	1	3	14	14	Staffs-Farm Machinery Manufacturer
Programming Device for LCA	1	3	15	15	
Precious Metal Plating/Gold Plating on Fresh Orchid	3	2	35	105	Additional Training Programme from the request
Welding Jix & Fixture	1	5	30	30	Cooperated with Agricultural Dept Ministry of Agriculture
Sub-Total				194	
Grand-Total				951	

## 2. Extension & Consultancy Service

### 2.1 Firm-by-Firm basis extension service

	<u>No. of firms</u>	<u>Remarks</u>
Plating Shop	4	Bangkok area
Foundry Shop	2	Samutprakarn area
Machining Shop	2	Samutprakarn area
Heat Treatment Shop	2	Bangkok + U-dorntani
Welding Shop	1	Bangkok
LCA Technigue	1	Bangkok

2.2 Consultancy Service 59 Bangkok & Provincial

### 2.3 General extension service

Surface finishing service	70	
Welding service	32	Bangkok + Provincial area
Machining service	40	
Foundry service	38	
General problem solving service	20	

## 3. Investigation + Experimentation Activities

Press dies

Paper cutting M/C

Nonferrous casting

Centrifugal casting process by using rubber model

Material catching arm operated by pneumatic

## 4. Technical Information Activities

### 4.1 Provision of Information

Texts + Handbook + Journal and etc. are produced and translated.

### 4.2 Technical Information Service

32 topics of Technical information related to the metalworking industry are circulated about 1,000 clients.

MIDI. W.L.K PLAN AND ACTIVITIES

fiscal year 1987 (October 1986 - September 1987)

Table 2

Activities	Oct.		Nov.		Dec.		Jan.		Feb.		Mar.		Apr.		May.		Jun.		Jul.		Aug.		Sept.		Remarks
	1-10	11-20	1-10	11-20	1-10	11-20	1-10	11-20	1-10	11-20	1-10	11-20	1-10	11-20	1-10	11-20	1-10	11-20	1-10	11-20	1-10	11-20	1-10	11-20	
1. Training activities																									
1.1 Bangkok Area																									
Precious Metal Plating																									
Electroplating Technique																									
Anodizing																									
Metallic Plating on Plastic																									
Hard Chrome																									
Slackening																									
Fundamental of LCA System																									
App. of Pneu. & Hyd. in LCA																									
Heat Treatment Technology																									
Normalizing																									
Welding Technology																									
TIG & MIG Welding Technology																									
Welding Jig. & Fixture																									
Welding for maintenance																									
Foundry Technology																									
Centrifugal Casting Technique																									
Engineering Drawings																									
Material Testing and Analysis																									
1.2 Provincial Area																									
Precious Metal Plating																									
Chromium Plating & Metal Blackening																									
Heat Treatment & Welding																									
Foundry Technology																									
1.3 Special Training Course																									
Cooperated with other institutions																									
Cooperated with private Co., Ltd.																									

Appendix II  
 Chantaburi  
 Khon-Kaen  
 Lampang  
 Phuket  
 Song-Khia

3-4 times/year

### MIDI. WORK PLAN AND ACTIVITIES

fiscal year 1987 (October 1986 - September 1987)

Activities	Oct.		Nov.		Dec.		Jan.		Feb.		Mar.		Apr.		May.		Jun.		Jul.		Aug.		Sept.		Remarks		
	1-4	5-10	11-16	17-21	22-26	27-31	1-4	5-9	10-14	15-19	20-24	25-29	1-5	6-10	11-15	16-20	21-25	26-30	1-4	5-9	10-14	15-19	20-24	25-29		30-31	
<u>2. Seminars</u> Metal Surface Finishing Technology Waste Water Treatment in Plating Shop Material Selection in Metal-working Industry Mould & Die Standard Parts Selection of Cutting Tool																										All seminars are being held by joint: to some other institutions and private firms	
<u>3. Staffs Training</u>																											6-10 persons will be trained
<u>4. Provide Testing &amp; Inspection Service</u>																											
<u>5. Undertake Techno-Economic Study</u>																											3-4 Industrial Products
<u>6. Educational Development System</u>																											

Achievement and Scheme  
on  
Seminars and Training Course  
Related to Metal-working and Machinery Industries  
(October 1, 1986 - September 30, 1987)

o.	Courses	No. of Courses	Period Per Courses (Days)	No. of Participants		Remark	
				Per Courses	Total		
	<u>1. Training</u>						
	<u>1.1 Bangkok area</u>						
1.	Precious Metal Plating	5	3	40	200	Training Programmes in Bangkok area will be held at ISI & MIDI	
2.	Electro plating technique	2	5	35	70		
3.	Anodizing	2	2	40	80		
4.	Plating on plastics	1	3	30	30		
5.	Hard Chrome Plating	2	3	30	60		
6.	Blackening	2	3	50	100		
7.	Fundamental of LCA	2	5	20	40		
8.	Application of Pneu. & Hyd. in LCA	1	10	30	30		
9.	Heat Treatment Technology	2	5	30	60		
10.	Martempering	1	5	20	20		
11.	Welding Technology	1	5	30	30		
12.	TIG & MIG Welding Technology	2	5	35	70		
13.	Welding for maintenance	2	5	40	80		
14.	Welding Jig & Fixture	1	5	30	30		
15.	Foundry Technology	2	5	25	50		
16.	Centrifugal Casting Technique	2	5	30	60		
17.	Engineering Drawings	1	5	25	25		
18.	Material Testing and Analysis	2	5	30	60		
	Sub-Total				1095		

No.	Courses	No. of Courses	Period Per Courses (Days)	No. of Participants		Remark
				Per Courses	Total	
<u>1.2 Provincial Area</u>						
0.	Precious Metal Plating	1	8	40	40	Training Programmes in Provincial Area will be held in each regional industrial promotion center/ other institution facility
1.	Chromium plating & Metal Blackening	1	8	30	30	
2.	Heat Treatment & Welding	1	8	30	30	
3.	Foundry Technology	1	8	30	30	
Sub-Total					130	
<u>1.3 Special Training Course</u>						
4.	Cooperated with other institutions	2	5	30	60	
5.	Cooperated with private Co.,Ltd.	2	3	50	100	
Sub-Total					160	
<u>2. Seminars</u>						
1.	Metal Surface Finishing Technology	1	2	30	30	All seminars are being held by joining to some other institutions and private firms
2.	Waste Water Treatment in Plating Shop	1	2	30	30	
3.	Material Selection in Metalworking Industry	1	1	30	30	
4.	Mould & Die Standard Parts	1	1	30	30	
5.	Selection of Cutting Tool	1	1	35	35	
Sub-Total					155	
Grand Total					1540	

Table 3 Allocation of MIDI Staff in 1986 - 1988

Organization	Activities	1986		1987		1988 (12-4-88)		Remarks
		C.S	P.C	C.S	P.C	C.S	P.C	
Administration Section	Planning/Coordination	3	-	3	-	3	-	Accumulative Figure from 1986-1988
	Adm. (General Affairs)	1	5	3	11	3	18	
	Testing & Inspection Section	4	-	4	-	4	1	
Research and Development Group	Quality Control	1	-	1	-	1	-	Accumulative Figure from 1986-1988
	Educational Development & Audio Visual Aid	2	1	5	1	5	2	
	Techno-Economic Study	3 (4)	-	4	-	4	-	
Research and Development Group	Engineering Design	3	-	5	-	6	-	Accumulative Figure from 1986-1988
	Automation Development Sys System	2	1	4	1	4	1	
	Casting	3	3	3	3	6	5	
Workshop Division	Heat Treatment & Forging	2	1	3	1	4	2	Accumulative Figure from 1986-1988
	Welding & Sheet Metal Work	2	1	3	1	4	2	
	Plating	2	3	3	3	4	3	
Workshop Division	Machining	4	2	5	2	10	5	Accumulative Figure from 1986-1988
	Maintenance	1	-	1	-	3	1	
	<b>Total</b>	<b>33</b>	<b>17</b>	<b>47</b>	<b>23</b>	<b>61</b>	<b>40</b>	

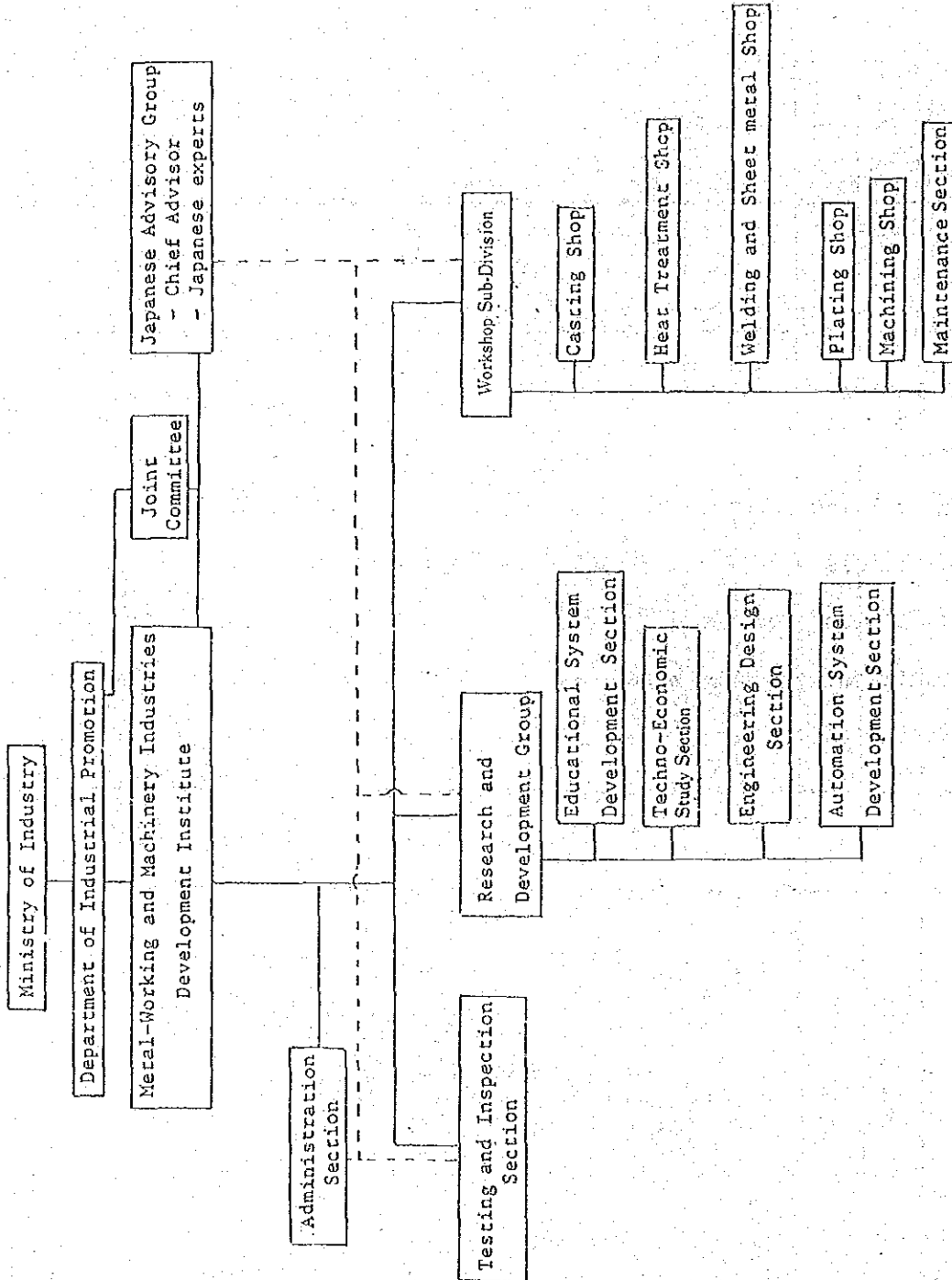


Table 4. Breakdown of Possible Allocation of MLDI Budget (1987-1991)

July 1986

	Thousand Baht				
	1987	1988	1989	1990	1991
Salaries	2,441.5	2,906	3,500	4,000	4,500
Wages	791	988	1,200	1,500	1,700
Travelling Expenses	558	900	1,200	1,400	1,600
Materials	1,368	1,600	1,800	2,200	2,400
Utilities Expenses	60	400	600	800	900
Equipment & Accessories	-	70	400	500	580
Miscellaneous	8	50	100	120	100
	5,226.5	6,914	8,800	10,520	11,780

Fig. 1 Organization Chart of the Project



Welcome Address

by

The Permanent Secretary of the Ministry of Industry

to

The Implementation Survey Team of JICA

Wednesday, July 23, 1986

-----  
Mr. Kitamura, the team leader of the mission.

Distinguished members of the mission,

Ladies & Gentlemen.

First of all, I would like to take this opportunity to welcome you, Mr. Kitamura, and all distinguished members of the Implementation Survey Team of JICA, to Thailand. As I am informed, the Team are here for details discussion with the staffs of the Department of Industrial Promotion on the technical assistance matter of the Metal-Working and Machinery Industries Development Institute (MIDI) Project. This event is of special significance because of the importance of the technology transfer from Japan to Thailand in the field of metal working and machinery industries development.

The transfer of technology, both in the form of basic technology and in the form of modern or applied technology, is particularly vital for a developing country such as Thailand. In a basic sense, the transfer helps upgrade technological capability. At the same time, it also contributes to the abatement of economic problems and to better mutual understanding. It is for these roles that MIDI has been conceived and about to be realized.

The MIDI project is the very first project under the Ministry of Industry, which has been accorded a grant-aid from the Government of Japan. For this, we hold a special gratitude.

Grant-aid, although vital, cannot alone guarantee a successful accomplishment of the specified objectives of the project, without the technical assistance and the full understanding and commitment by both countries. The Ministry of Industry gives full support to the Department of Industrial Promotion in undertaking its obligatory contribution in terms of manpower and government budget, so that the project's goals may be fully achieved.

Finally, I wish to express my thanks on behalf of the government agency and the private industries alike, for the cooperation and assistance given by the Government of Japan. I also wish your mission to have a successful discussion with our staffs and I am sure that the technical assistance will lead to a good mutual understanding between us.

Thank you.