
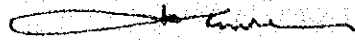


Finally, the Japanese side acknowledged to the Malaysian side for their heartiest cooperation and vice versa.

Shah Alam, 15 March, 1990



Naomichi Hara  
Chief Advisor  
JICA



Helme Hashim  
Head, FTU  
SIRIM

Attachment : Annex I - Installation changes  
Annex II - Safety measures in FTU  
Annex III - Results of performance test

*an.4*

INSTALLATION CHANGES

## 1. Dust Collector

## 1) for High Frequency Furnace

The centre of duct installed underground was shifted 500 mm to 690 mm, which is measured from No.11 pillar side, due to the installed condition ( Fig.1 ).

The ladder was shifted to No.10 pillar side due to an interference between the ladder and wiring support ( Fig.1 ).

## 2) for Sand Dryer

Instead of the ladder originally planned to be installed at the wall side, a new deck was installed between the top of dust collector for CO<sub>2</sub> sand preparation and the top of dust collector for sand dryer ( Fig.2 ).


## 2. High Frequency Furnace

The location of 500 kg furnace was shifted by 14.5 mm from the centre of 100 kg furnace. The wiring and ducting will be adjusted during the installation of power supply ( Fig.3 ).

Due to lack of the depth of 500 kg furnace's pit caused by thick plastering to prevent water leakage, refractory bricks should be laid flatly laying the side with 65 mm in thickness perpendicular to the wall and floor of pit.

The floor level around the furnace is so rough that final setting of the furnace height should be done after setting the pit cover.

Or. Ht



### 3. Green Sand Preparation

Because of lack of the depth of pit caused by thick plastering to prevent water leakage and rough floor level, the whole equipment was raised by 30 ~ 50 mm ( Fig.4 ).

The deck of the shake out machine protrudes into the safety path, but its setting is of the original plan. The safety path will be relocated by Malaysian side ( Fig.5 ).

The steps of deck for control panel was shifted due to an interference between the steps and the existing distribution board.

### 4. CO<sub>2</sub> Sand Preparation

The centre of bucket elevator was shifted from 1950 mm to 1850 mm, which is measured from No.A pillar side, because the support of dust collector protrudes to the safety path.

The safety fence was shifted to the inner side due to an interference between the fence and the duct for sand dryer.


The control panel was raised on the deck for easy operation.

### 5. Sand Dryer

Because of lack of the pit width by 30 mm and an interference between the dryer's support and wiring support, the centre of dryer was shifted from 1950 mm to 2010 mm, which is measured from No.A pillar side ( Fig.6 , 7 ).

As continuous running of the vibrator of No.1 hopper often caused blocking of the discharge, it was changed into intermittent running by adding a timer ( Fig.8 ). In addition, the material of the gate was changed into rubber.

*On. A*



Because of malfunction of the pressure gauge of LPG , Japanese side should supply the replacement later. However this malfunction does not affect the operation itself.

#### 6. Pattern Making Machine

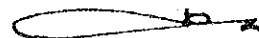
The location of each equipment and ducting was finally decided according to the view of safety and operational efficiency.

#### 7. Others

The shell core machine and the core blowing machine were shifted by 1000 mm to the inner side due to an interference between these machines and the existing washing sink.

Due to safety operation, the timing of alarm of shot blast machine, which showed the machine stop, was changed from the stop point of shot supply to the stop point of impeller's rotation ( Fig.9 ).

an.4



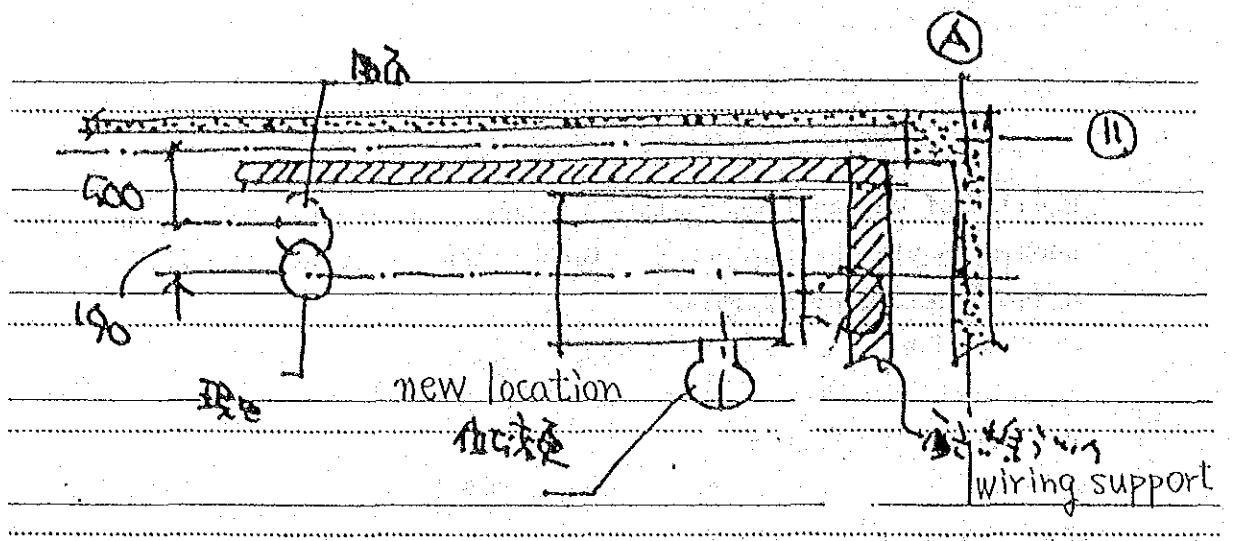


Fig. 1

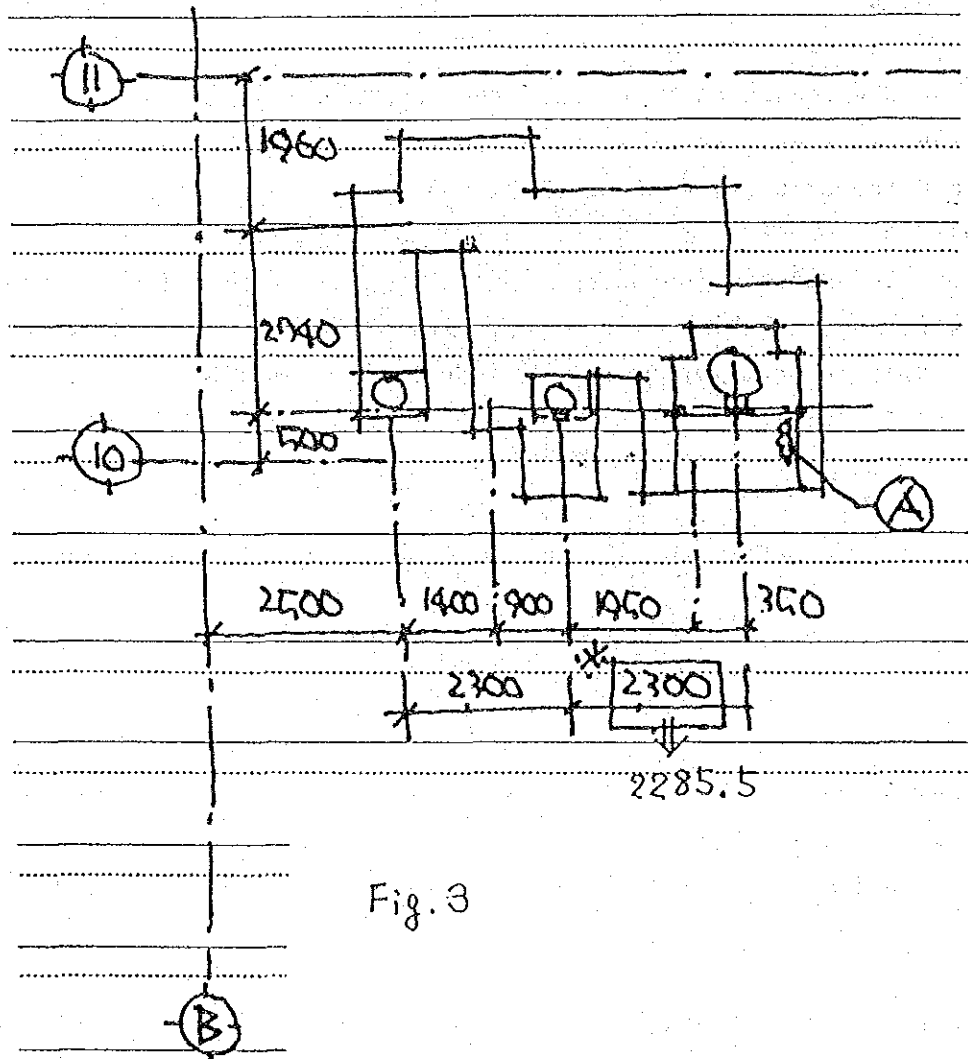
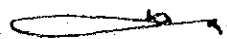


Fig. 3

On. 14



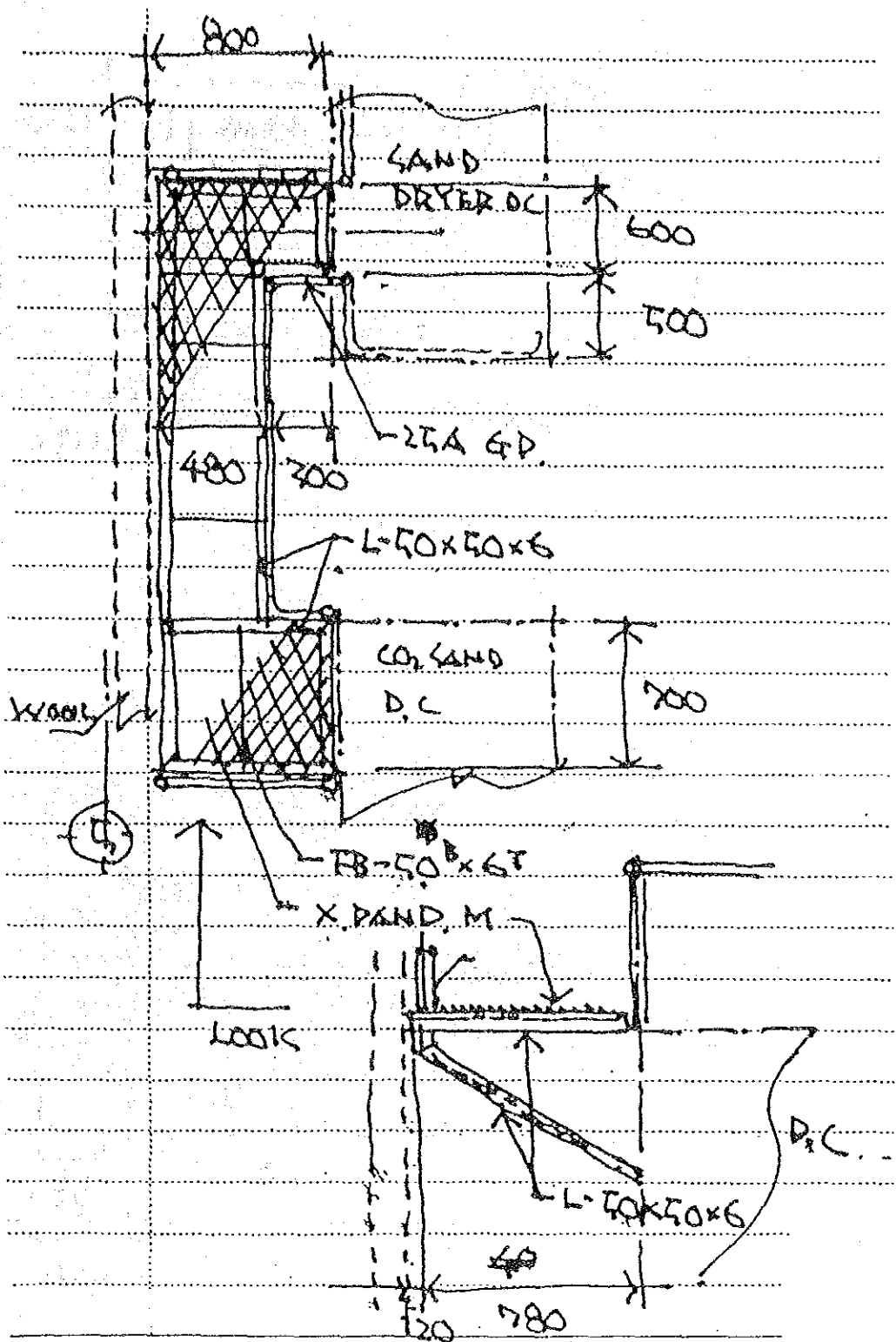


Fig. 2

and

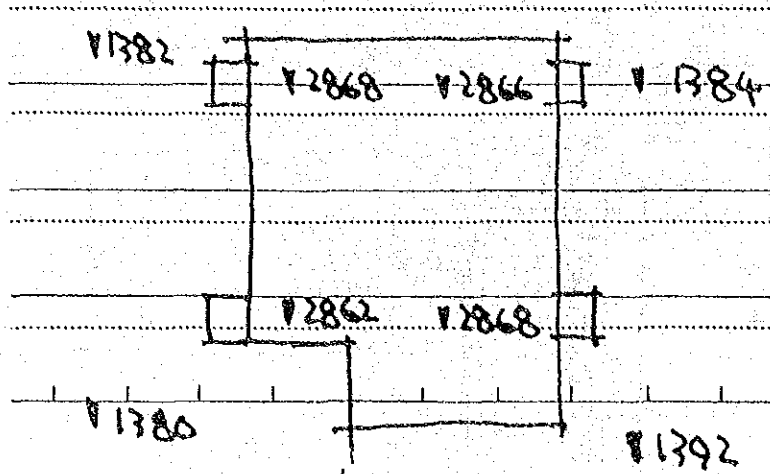


Fig.4

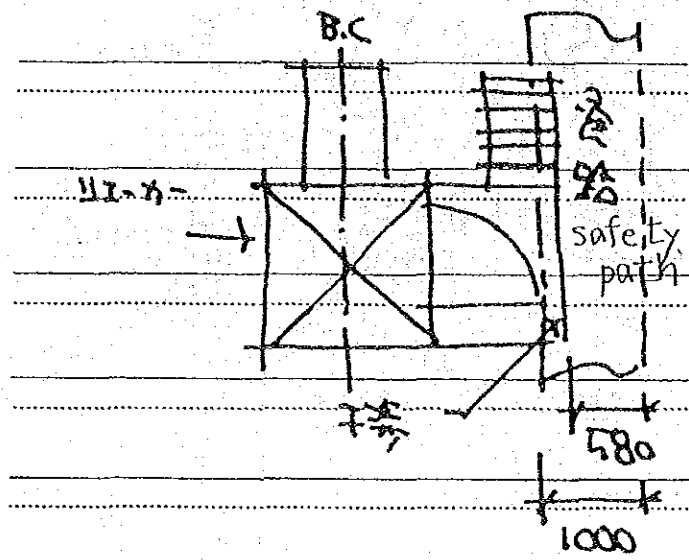


Fig 5

Ch. ut

ba

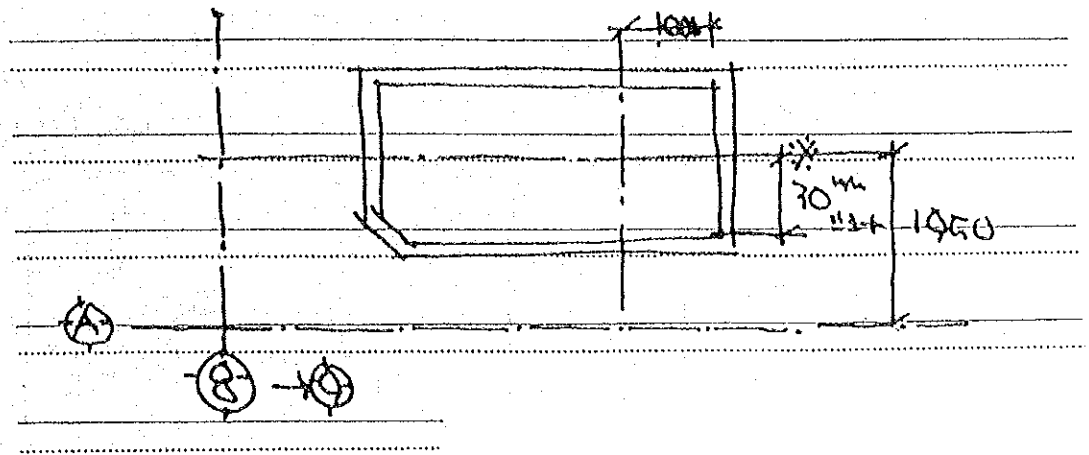


Fig. 6

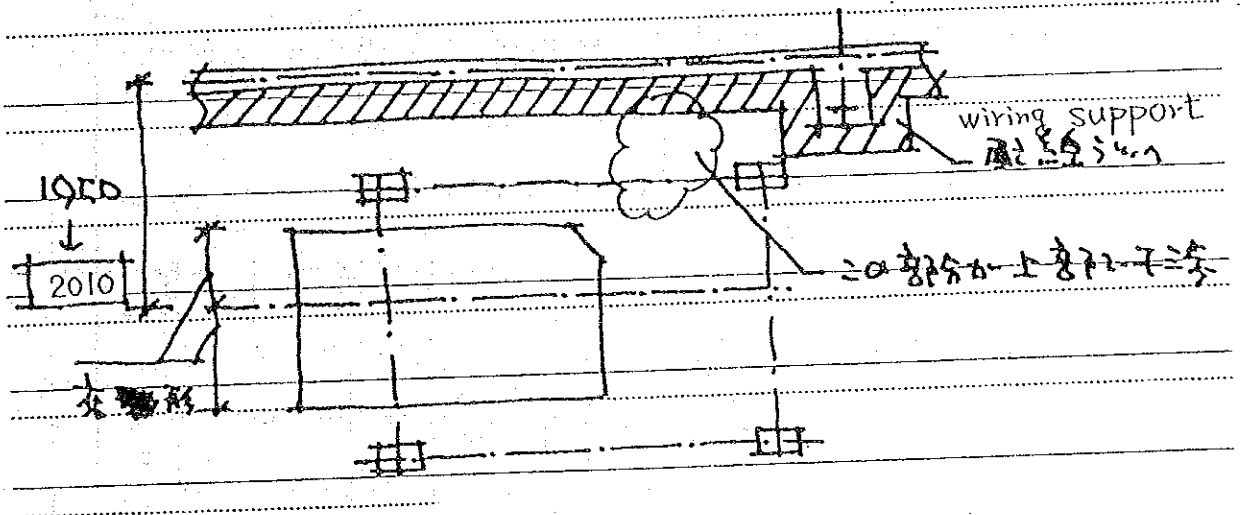
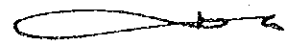
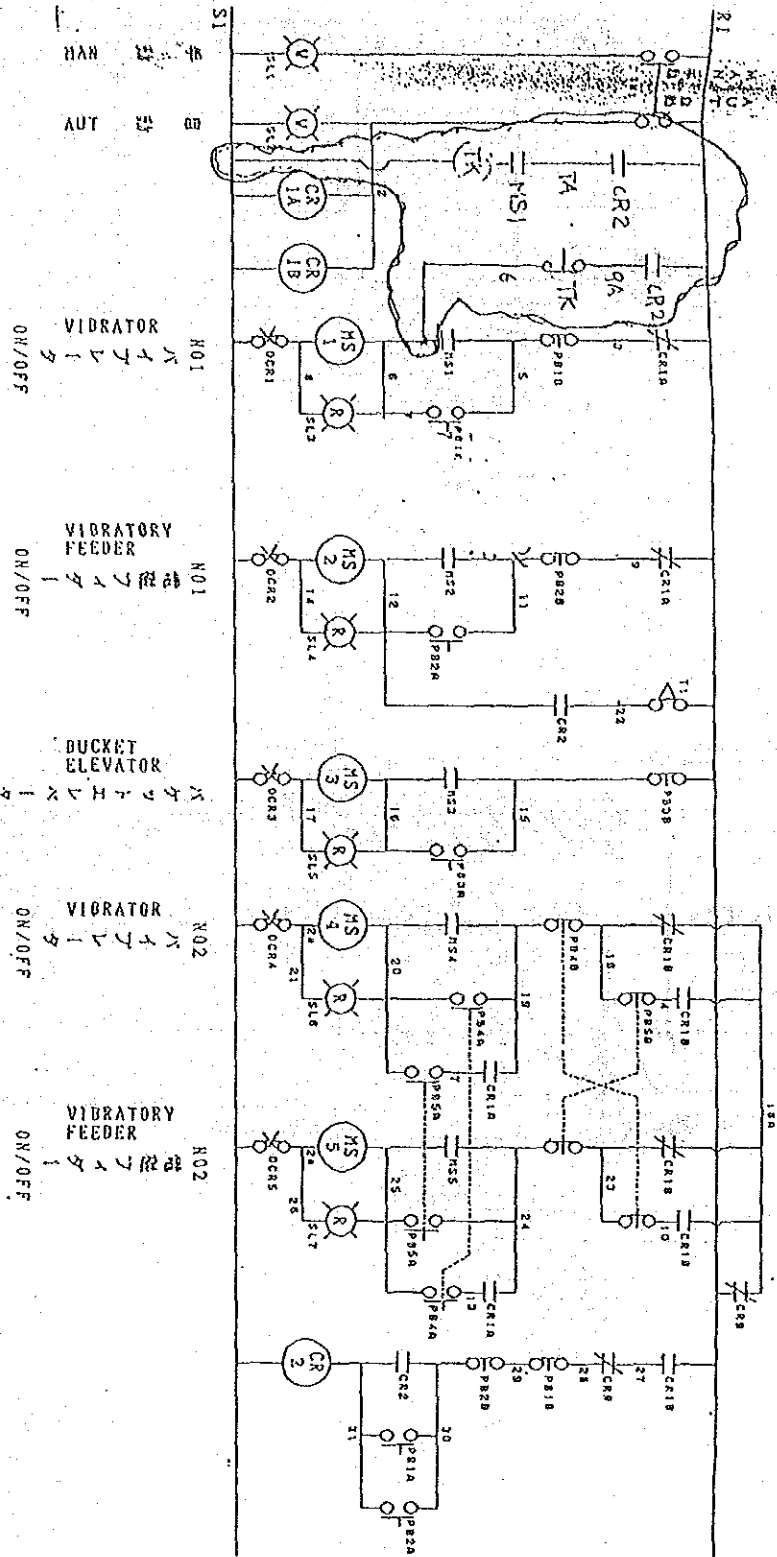


Fig. 7

omit







N01 VIBRATOR  
 振動機  
 ON/OFF

N01 VIBRATORY FEEDER  
 振動機  
 ON/OFF

N02 BUCKET ELEVATOR  
 斗式エレベータ  
 ON/OFF

N02 VIBRATOR  
 振動機  
 ON/OFF

N02 VIBRATORY FEEDER  
 振動機  
 ON/OFF

Fig. 8

PRICE NAME & DESCRIPTION	MATERIAL	QTY	REMARKS
MATERIAL LIST			
MASUHO SEISAKUSHO LTD.			
ARAKAWA-KU, TOKYO, JAPAN			
DATE	SCALE		
CMX-D	CM-491	105	
<small>This drawing is the property of MASUHO SEISAKUSHO LTD. and is loaned to you for your reference only. It is not to be reproduced, stored in a retrieval system, or transmitted in any form or by any means, electronic, mechanical, photocopying, recording, or by any information storage and retrieval system, without the prior written permission of MASUHO SEISAKUSHO LTD.</small>			

CMX



SAFETY MEASURES IN FTU

Japanese experts ( installation and technology transefer ) and FTU personnel conducted a joint inspection on the site to secure the safety in the workshop on 6 March 1990 ( 9:00 - 10:00 a.m )

Required measures were pointed out as follows :

Besides, both sides agreed to designate Mr. Hiroshi Kanamori and Mr. Mohd Akhir Yeop Kamarudin as safety supervisor at FTU.

1. General
  - 1) Only authorized personnel is allowed to operate respective machinery.
  - 2) All machinery should be run and maintained properly and carefully.
  
2. Wheel-type Grinders (for Finishing, XRF and Pattern Making)
  - 1) Do not use glass spectacles.  
Use propper goggles.  
Place goggles in proper location after use.
  - 2) Ensure the steady rotation before grinding for about 1 minute.  
When a new grinding wheel is set, the steady rotation is secured for 3 minutes before use.  
The operator should not stand in front of grinding wheel during this checking.
  - 3) The double-head grinder for finishing should be fixed by anchor bolts.
  
3. Shot Blast Machine.
  - 1) Remove the electrical switch key before loading and unloading, and the key should be kept by the operator. During maintenance and cleaning work inside the shot blast machine, follow the same procedure.
  
4. CO<sub>2</sub> Preparation
  - 1) Remove the electrical switch key and the key should be kept by the operator during maintenance and cleaning work of the mixer.
  
5. Green Sand Preparation
  - 1) Remove the electrical switch key and the key should be kept by the operator during maintenance and cleaning work of the mixer.
  - 2) Proper fencing must be done around the equipment.

6. Universal Mixer

- 1) Remove the electrical switch key before loading and unloading, and the key should be kept by the operator. During maintenance and cleaning work inside the mixer, follow the same procedure.

7. Core Blowing Machine

- 1) CO<sub>2</sub> gas cylinder should be fixed by clamps.

8. Cranes

- 1) Distance of supporters of the flexible electrical cable for hoist should be shortened to a half of the present pitch.
- 2) The storing box for the control box of the crane should be fixed on the wall at a suitable location and the control panel should be stored in it when not used.

9. Sand dryer

- 1) When work is done at the top of sand dryer, use a safety harness and switch off the breaker of the cranes.

RESULTS OF PERFORMANCE TEST

## 1. Green Sand Preparation

## 1) Test of Sand Feeder

The test was carried out by checking the No.09 belt conveyor's charging capacity.

## Test conditions ;

sand ; green sand supplied by Japanese side  
 moisture content of sand ; 2.9 %  
 setting of the timer ; 13 sec

## Test result ;

average weight of discharged sand ( N = 3 ) ; 130 kg

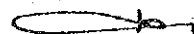
## 2) Test of Mixer

The test was carried out by checking a scatter of five mixed sand characteristics sampled at random in one batch.

## Test conditions ;

sand ; green sand supplied by Japanese side  
 amount of sand ; 130 kg  
 addition of bentonite ; 1 %/sand  
 addition of water ; 2 %/sand  
 mixing time ; 3 min

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Test Results ;

sample number	No.1	No.2	No.3	No.4	No.5
moisture content ( % )	4.6	4.8	4.6	4.7	4.7
compressive strength ( kg/cm <sup>2</sup> )	1.12	0.95	0.94	0.94	0.90
permeability ( AFS )	102	93	96	93	90
S.S.I.	96.3	96.2	95.9	96.0	95.7

3) Test of Shake Out Machine and Magnetic Separator

The test was carried out for checking the specification by using green sand mould, which was moulded by jolt-squeeze machine, with some bolts and nuts.

Test conditions ;

The mould checked in Test Item 2 ( Test of Jolt-Squeeze Machine ) was used.

Test result ;

The mould was collapsed smoothly, and all bolts and nuts were separated from the sand by magnetic separator.

2. Jolt-Squeeze Machine

The test was carried out by checking mould hardness and strength in three moulds.

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### 3. CO<sub>2</sub> Sand Preparation

#### 1) Test of Sand Feeder

The test was carried out by checking the No.06 belt conveyor's charging capacity.

##### Test conditions ;

sand ; silica sand supplied by Japanese side  
setting of timer ; 7 and 10 sec

##### Test results ;

average weight of discharged sand in 7 sec ( N = 3 ) ; 145 kg  
average weight of discharged sand in 10 sec ( N = 3 ) ; 193 kg

### 4. Core Blowing Machine

The test was carried out by checking a scatter of five core weight and core hardness.

##### Test conditions ;

sand ; silica sand supplied by Japanese side  
addition of water glass ; 6 %/sand  
addition of wooden flour ; 0.4 %/sand  
addition of coal dust ; 1.4 %/sand  
horizontal clamp pressure : 6 kg/cm<sup>2</sup>  
vertical clamp pressure ; 6 kg/cm<sup>2</sup>  
blowing pressure ; 3 kg/cm<sup>2</sup>

*an. A*



Test results ;

sample No.	core weight(kg)	core hardness
No.1	0.39	52
No.2	0.39	46
No.3	0.40	56
No.4	0.40	56
No.5	0.40	42

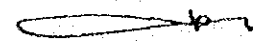
5. Shell Core Machine

The test was carried out by checking a scatter of five core weight and core hardness.

Test conditions

sand ; resin coated sand supplied by Japanese side  
die temp. ; 270 ~ 280 °C  
blow ressure ; 3.0 kg/cm<sup>2</sup>  
blow time ; 3 sec  
air exhaust time ; 2 sec  
curing time ; 25 sec

*an. it*



Test results ;

sample No.	core weight (kg)	core hardness
No.1	0.40	76
No.2	0.36	74
No.3	0.39	62
No.4	0.40	69
No.5	0.40	67

#### 6. Shot Blast Machine

The test was carried out by checking the surface roughness of sample.

Test conditions ;

shot ; steel shot ( TSH - 170  $\phi$  1.8 )  
shot time ; 15 min \* 2 times  
sample ; pig iron

Test results ;

Comparing with surface roughness tester, a surface of the sample was cleaned by 70 ~ 100 S.

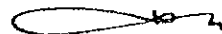
#### 7. Sand Dryer

The test was carried out by checking the moisture content of dried sand.

Test conditins ;

It is shown in Fig.10.

On.14



Test results ;

It is shown in Fig.10.

In addition ,the following data was checked for the references.

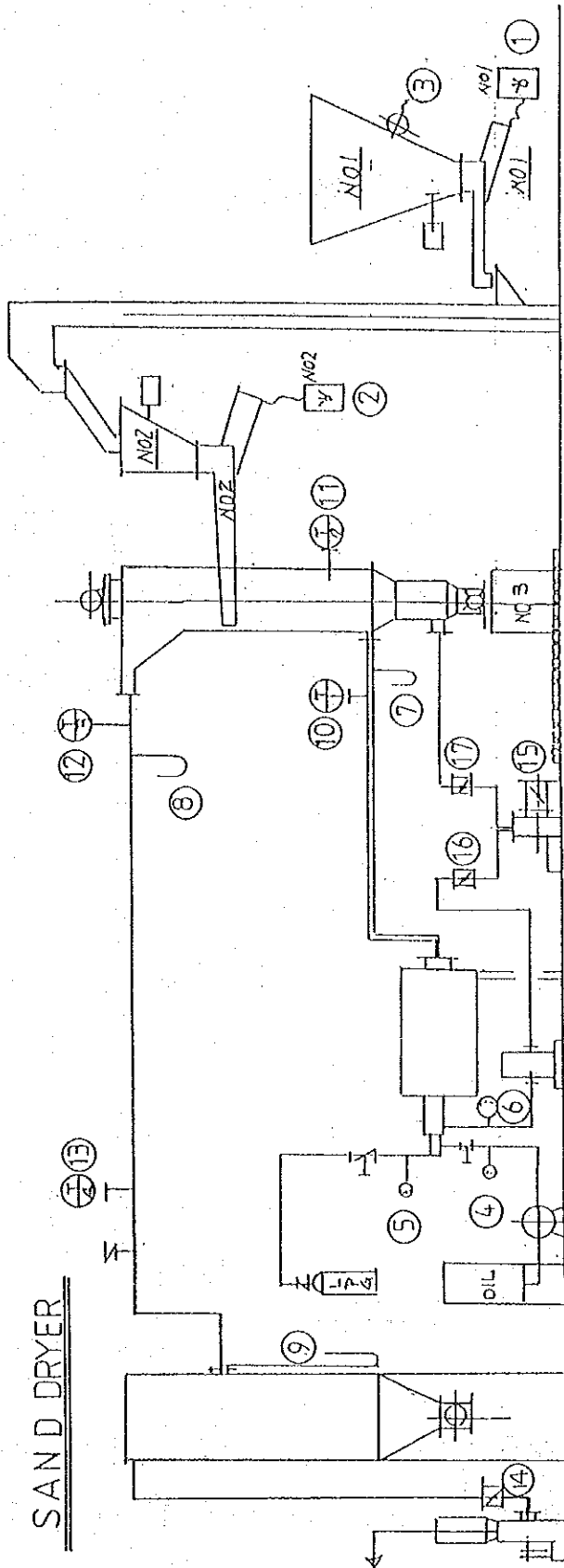
- ① relationship between oil consumption and moisture content  
( Fig.11 )
- ② relationship between oil consumption and air pressure  
( Fig.12 )
- ③ relationship between graduations of No.1 Feeder and a charging  
rate of the wet sand.  
( Fig.13 )

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SAND DRYER



date	sand name & treatment capacity (kg/hr)	moisture content		consumption of kerosene (l/hr)	(1) graduations of No.1 feeder	(2) graduations of No.2 feeder	(3) No.1 vibrator		(4) oil pressure (kg/cm <sup>2</sup> )	(5) LPC pressure (mmHg)	(6) burner air pressure (mmHg)	(7) inlet pressure (mmHg)	(8) outlet pressure (mmHg)	(9) pressure difference (mmHg)	(10) T-1 temp. (°C)	(11) T-2 temp. (°C)	(12) T-3 temp. (°C)	(13) T-4 temp. (°C)	(14) graduations of damper	(15) graduations of damper	(16) graduations of SV-3 damper	(17) graduations of SV-4 damper
		before drying (%)	after drying (%)				run (sec)	stop (sec)														
'90 3/12	Tin mine 620	8.4	0.1	10-11	3.5	9	10	25	0.5	900	240~ 280	Δ20	Δ70	Δ5	500	240	1011	81	30	40	30	8

Fig. 10

砂 500 kg/H 時の推定 OIL 使用量

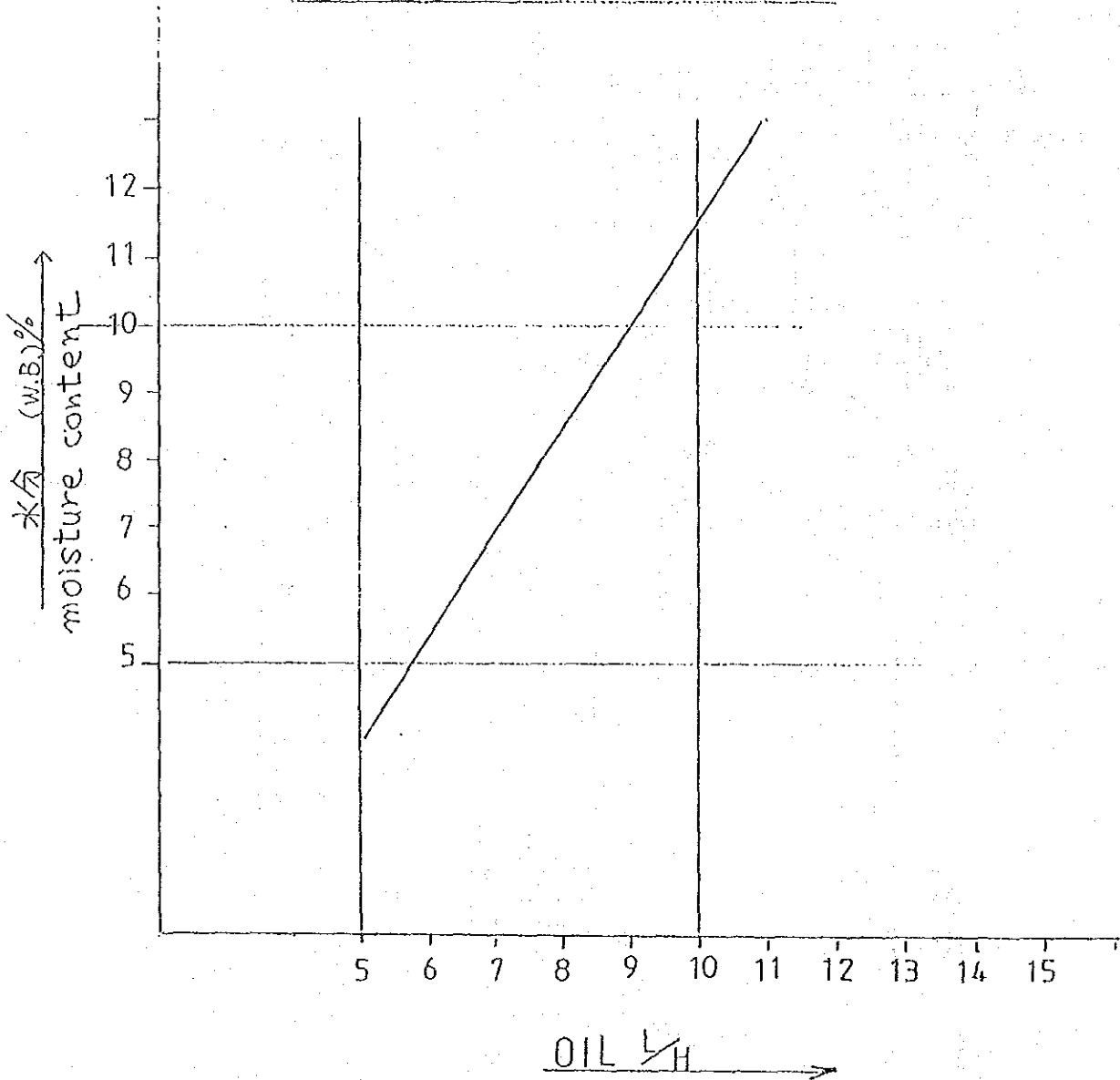
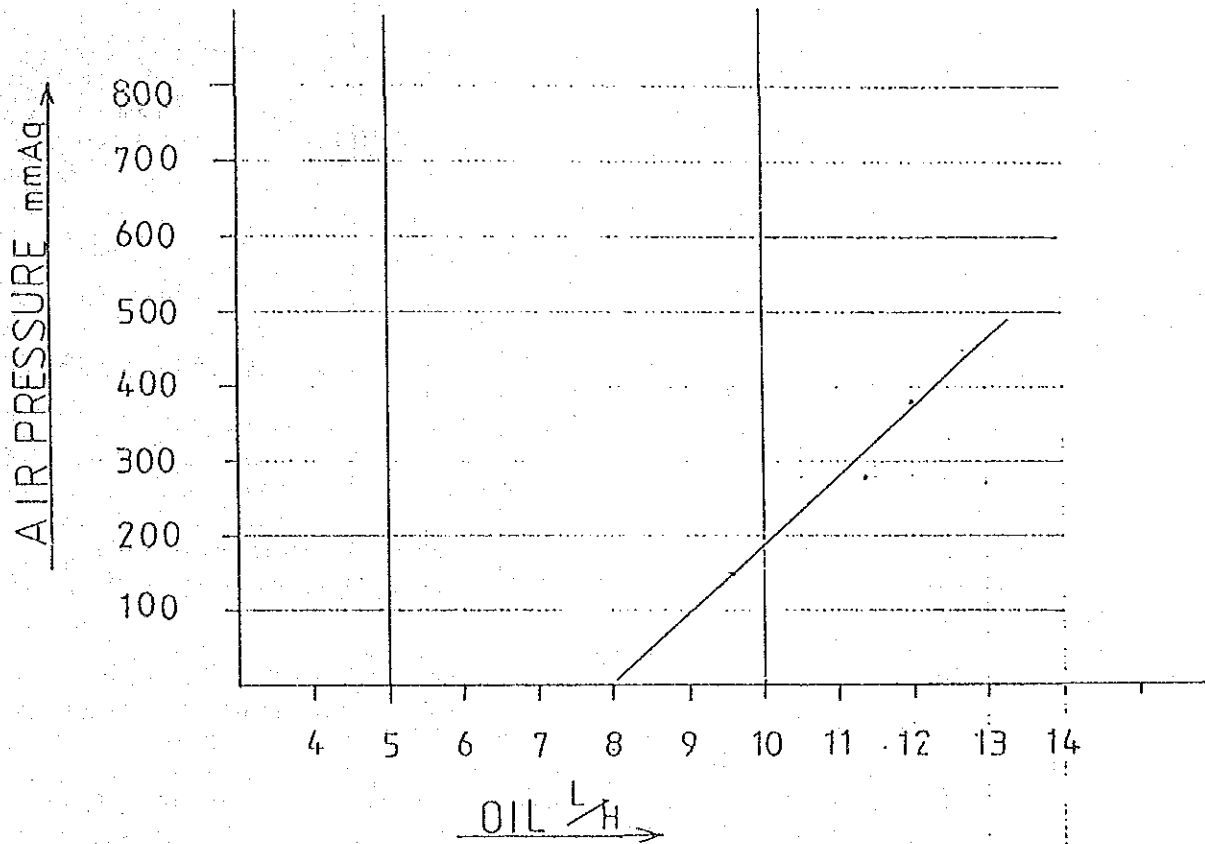


Fig 11 Relationship between estimated oil consumption and moisture content of wet sand

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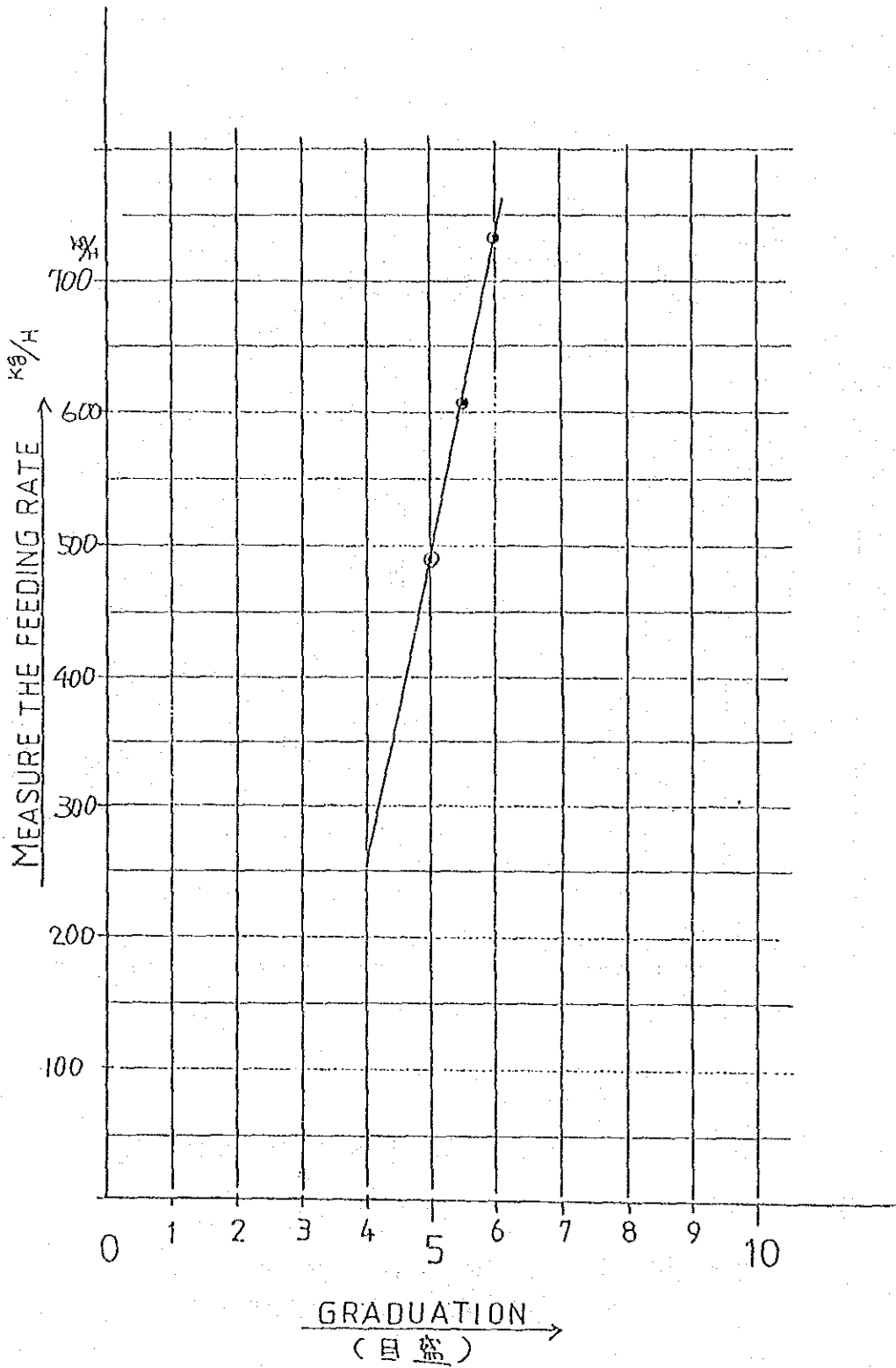
OIL PRESSURE  $0.5 \text{ kg/cm}^2$

3/12 B.

Fig 12 Relationship between oil consumption and air pressure

On it

NO. 1 FEEDER



(3月12日測定 水分8.9%)

Fig 13 Relationship between graduations of No.1 feeder and charging rate of wet sand

Amif

10-1-2 「マ」側よりの感謝状

Surat kami : SIRIM 415/2/1/3-JICA

Surat tuan :

Bila menjawab , sila beri rujukan Institut Ini.



INSTITUT PIAWAIAN DAN  
PENYELIDIKAN PERINDUSTRIAN  
MALAYSIA  
Standards & Industrial Research Institute of Malaysia  
Persiaran Dato' Menteri, Seksyen 2,  
Peti Surat 35, 40700 Shah Alam,  
Selangor Darul Ehsan,  
MALAYSIA

15 March, 1990

Mr. Takeo Ohno  
Manager  
Development Section  
HITACHI METALS KYUSHU ENG. LTD.  
JAPAN.

Dear Mr. Ohno,

LETTER OF APPRECIATION

The installation and commissioning work of all the equipment (except the induction furnace) donated by JICA has now been accomplished under your supervision. I am glad that the work has been done and soon we hope to operate the equipment and to acquire the foundry technology from the other long term experts attached with FTU.

I am writing to congratulate you for your excellent job and cooperation that has made the installation work a success. While you were here for this short period of time, I personally felt that you are not just a working colleague but also a friend that I really enjoy working with. The same goes for my staff which many have express their appreciation of you, your expert ability and interesting character. Although you are not quite able to communicate in English very well, but your ability to express yourself in a very unique manner has attracted FTU personnel to make all possible effort to try to understand and cooperate with you. The result is you are able to lead them with full efficiency.

The last two months has been a very interesting but laborious period for all FTU personnel. I must say here, having you as a supervisor to carry out the heavy task of installation work, is a factor that has helped in boosting the morale and spirit of FTU staff. It is the way you conduct yourself and your excellent leadership that has driven FTU personnel to work hard and to complete the job on time. Also, it is your way of carrying out your job has attracted FTU staff to emulate the Japanese way of doing work. To me this can be considered as an indirect transfer of Japanese work ethics, which FTU personnel will always cherished.




From my own personal observation and experience with JICA projects, equipment installation phase is the most challenging and taxing period for everybody involved. It is during this period that many problems arise and even hard argument can spark off if situation is not under control. Here I am extremely grateful to you with your patience and understanding our installation work in FTU has proceeded in harmony.

On behalf of FTU staff, I would like to record herewith a sincere appreciation and many thanks for your excellent job and cooperation in supervising the installation work at FTU. We all are looking forward to see you again in July for the installation of Induction Furnace.

Thank you again and safe journey home.

Yours Sincerely,

  
(HELME HASHIM)  
Head of Foundry Technology Unit.  
SIRIM

c.c

- Senior Executive Managing Director,  
Automotive Components Division  
HITACHI METALS, LTD.  
JAPAN.
- Mr. Muneshige YAMAZAKI  
Managing Director,  
Mining and Industrial Development  
Cooperation Department.  
Japan International Cooperation Agency (JICA)  
JAPAN.
- Mr. Kazuo Okabe  
Resident Representative,  
JICA Malaysia Office  
Kuala Lumpur,
- Dr. N. Hara,  
Chief Advisor,  
FTU project, SIRIM

10-2 供与機材，携行機材管理台帳



Equipment List / Foundry Technology Unit

R/D NO	NAME OF EQUIPMENT	QUANTITY	ARRIVAL	PLACE	IN CHARGE	CONDITION	PRICE	BUDGET
1	<u>MELTING</u>							
101	500kg DURA-LINE FURNACE (#84319) WITH RING HOOD	1 pc	14/12/89 YPK - 23	MELTING SECTION	MOHD AKHIR	SERVICEABLE	¥21,500,000.-	昭和63年度供与撥材 (本邦購送)
	MELTING POWER SUPPLY 325KW-3000HZ VIP POWER - TRAK (#89-84200-246-11)	1 pc		MELTING SECTION	MOHD AKHIR	SERVICEABLE	¥6,000,000.-	
102	100kg DURA-LINE FURNACE (#83271) WITH RING HOOD	1 pc	14/12/89 YPK - 23	MELTING SECTION	MOHD AKHIR	SERVICEABLE	¥3,100,000.-	昭和63年度供与撥材 (本邦購送)
103	#50 SINGLE PUSH-OUT FURNACE (#84200)	1 pc	14/12/89 YPK - 23	MELTING SECTION	MOHD AKHIR	SERVICEABLE	¥1,800,000.-	昭和63年度供与撥材 (本邦購送)
104	HYDRAULIC POWER SUPPLY	19 pcs	14/12/89 YPK - 23	MELTING SECTION	MOHD AKHIR	SERVICEABLE	¥700,000.-	昭和63年度供与撥材 (本邦購送)
	WATER COOLED MODULE	5 pcs		OUT SIDE FOUNDRY	MOHD AKHIR	SERVICEABLE	¥4,700,000.-	
	TRANSFORMER	1 pc		MELTING SECTION	MOHD AKHIR	SERVICEABLE	¥4,500,000.-	
	ACCESSORIES & SPARE PARTS	399 pcs		MELTING SECTION	MOHD AKHIR	SERVICEABLE	¥1,200,000.-	
105	DUST COLLECTOR	1 set	07/12/89 NPK - 002	MELTING SECTION	MOHD AKHIR	SERVICEABLE	¥5,900,000.-	昭和63年度供与撥材 (本邦購送)
106	FLOOR SCALE, MODEL NUMBER DI-2	1 unit	12/08/89 YPK - 08	MELTING SECTION	MOHD AKHIR	SERVICEABLE	¥3,200,000.-	昭和63年度供与撥材 (本邦購送)
	SCALE, MODEL NUMBER SD-50	1 unit		MELTING SECTION	MOHD AKHIR	SERVICEABLE	¥51,000.-	
107	GEARED CRANE LADLE, MODEL NIG-600	2 units	12/08/89 YPK - 08	MELTING SECTION	MOHD AKHIR	SERVICEABLE	¥1,320,000.-	昭和63年度供与撥材 (本邦購送)
	GEARED CRANE LADLE, MODEL NIG-100	2 units		MELTING SECTION	MOHD AKHIR	SERVICEABLE	¥1,320,000.-	
	GEARED CRANE LADLE, MODEL NIG-50 WITH BRICKS	1 unit		MELTING SECTION	MOHD AKHIR	SERVICEABLE	¥437,000.-	
108	GAS BURNER, MODEL TMG-68-L-D WITH STAND	1 set	12/08/89 YPK - 08	MELTING SECTION	MOHD AKHIR	SERVICEABLE	¥1,650,000.-	昭和63年度供与撥材 (本邦購送)
109	OVER HEAD HOIST CRANE	2 sets		WORK SHOP	ZAIN	SERVICEABLE		PREPARATION OF SIRIX SIDE
110	FORK LIFT CAR	1 unit	31/03/89	WORK SHOP	ZAIN	SERVICEABLE	¥378,500.-	昭和63年度供与撥材 (現地購送)
111	PIG IRON ( FOR GRAY IRON )	1,000 kg	19/02/90 NPK - 015	SAND STOR	MOHD AKHIR	SERVICEABLE	¥104,000.-	松波、小堀専門家携行撥材 (本邦購送)
	PIG IRON ( FOR DUCTILE )	1,000 kg		SAND STOR	MOHD AKHIR	SERVICEABLE	¥126,000.-	
	STEEL SCRAP ( CARBON, STEEL )	1,000 kg		SAND STOR	MOHD AKHIR	SERVICEABLE	¥66,500.-	
	FERRO SILICON ( 75 ) ALLOY	100 kg		SAND STOR	MOHD AKHIR	SERVICEABLE	¥32,300.-	
	FERRO MANGANE ( 75 ) ALLOY	100 kg		SAND STOR	MOHD AKHIR	SERVICEABLE	¥22,200.-	
	FERRO SILICON MAGNESIUM ( 5.8 ) ALLOY	30 kg		SAND STOR	MOHD AKHIR	SERVICEABLE	¥9,990.-	

Equipment List / Foundry Technology Unit

R/D NO	NAME OF EQUIPMENT	QUANTITY	ARRIVAL	PLACE	IN CHARGE	CONDITION	PRICE	BUDGET
111	FERRO SILICON MAGNESIUM ( 3:8 ) ALLOY	10 kg	19/02/90 NPK - 015	SAND STOR	MOHD AKHIR	SERVICEABLE	¥3,000.-	松茂、小嶋専門家を代行送料 (本邦製造)
	FERRO SILICON ALLOY ( 75 )	30 kg		SAND STOR	MOHD AKHIR	SERVICEABLE	¥6,000.-	
	FERRO SILICON ALLOY ( 50 )	10 kg		SAND STOR	MOHD AKHIR	SERVICEABLE	¥1,200.-	
	FERRO SILICON ALLOY ( 72 )	10 kg		SAND STOR	MOHD AKHIR	SERVICEABLE	¥1,500.-	
	FERRO SILICON RARE ALLOY	10 kg		SAND STOR	MOHD AKHIR	SERVICEABLE	¥6,000.-	
	CARBON POWDER	50 kg		SAND STOR	MOHD AKHIR	SERVICEABLE	¥5,000.-	
	SHOT	50 kg		SAND STOR	MOHD AKHIR	SERVICEABLE	¥5,000.-	
	SLAG OFF AGENT	20 kg		SAND STOR	MOHD AKHIR	SERVICEABLE	¥2,000.-	
	INOCULATION MACHINE	5 kg		SAND STOR	MOHD AKHIR	SERVICEABLE	¥50,000.-	
	INOCULATION MACHINE	1 kg		SAND STOR	MOHD AKHIR	SERVICEABLE	¥2,000.-	
	HOLDING PIECE	2 kg		SAND STOR	MOHD AKHIR	SERVICEABLE	¥10,000.-	
	SAMPLING CHILL MOLD	2 kg		SAND STOR	MOHD AKHIR	SERVICEABLE	¥20,000.-	
	CALCIUM SILICON ALLOY	50 kg		SAND STOR	MOHD AKHIR	SERVICEABLE	¥5,000.-	
	ALUMINUM INGOT	5 kg		SAND STOR	MOHD AKHIR	SERVICEABLE	¥1,000.-	

Equipment List / Foundry Technology Unit

R/D NO	NAME OF EQUIPMENT	QUANTITY	ARRIVAL	PLACE	IN CHARGE	CONDITION	PRICE	BUDGET
2	<u>MOULDING</u>							
201	JOLT SQUEEZE STRIPPER MOULDING MACHINE	2 sets	07/12/89 NPK - 002	MOULDING SECTION	JAMIL	SERVICEABLE	¥3,300,000.-	昭和63年度供与様材 (本邦購送)
202	ROLLER CONVEYOR, RH TYPE (PARALLEL) WIDTH : 300mm. LENGTH : 3,000 mm.	1 set	12/08/89 YPK - 08	MOULDING SECTION	JAMIL	SERVICEABLE	¥203,600.-	昭和63年度供与様材 (本邦購送)
203	MOULDING FLASK 1000 X 800 X 300 / 250 WITH MOULDING BOARD, GAGGER, CLAMP, GUIDE PINBUSH & HUNGER MOULDING FLASK 580 X 460 X 250 / 250 WITH MOULDING BOARD, GAGGER, CLAMP, GUIDE PINBUSH & HUNGER MOULDING FLASK 300 X 240 X 200 / 200 WITH MOULDING BOARD, GAGGER, CLAMP, GUIDE PINBUSH & HUNGER	3 sets 5 sets 10 sets	19/10/89 YPK - 16	MOULDING SECTION MOULDING SECTION MOULDING SECTION	JAMIL JAMIL JAMIL	SERVICEABLE SERVICEABLE SERVICEABLE	¥3,300,000.- ¥3,600,000.- ¥5,400,000.-	昭和63年度供与様材 (本邦購送)
204	AIR RAMMER, MODEL FR - 0, FR - 0L	2 sets	12/08/89 YPK - 08	SAND TESTING ROOM	JAMIL	SERVICEABLE	¥202,500.-	昭和63年度供与様材 (本邦購送)
205	TOOLING OF TEST BAR ( FOR FLASK SIZE, 580 X 460 ) TOOLING OF TEST PIECE ( FOR FLASK SIZE 300 X 240 )	1 set 1 set	19/10/89 YPK - 16	SAND TESTING ROOM SAND TESTING ROOM	JAMIL JAMIL	SERVICEABLE SERVICEABLE	¥1,300,000.- ¥1,100,000.-	昭和63年度供与様材 (本邦購送)
206	ALUMINIUM OPENING AND SHUTTING METAL FRAME NO. 13 300 x 400 x 100 / 100	2 sets	05/01/89 232- 98041484	SAND TESTING ROOM	JAMIL	SERVICEABLE	¥167,000.-	深井専門家携行様材 (本邦購送)
207	CARBONIC ACID GAS PRESSURE REGULATOR FCR803K 220V.	1 set	05/01/89 232- 98041484	SAND TESTING ROOM	JAMIL	SERVICEABLE	¥37,500.-	深井専門家携行様材 (本邦購送)
208	MEASURING APPARATUS YAMATO YSD-30	1 set	05/01/89 232- 98041484	SAND TESTING ROOM	JAMIL	SERVICEABLE	¥80,500.-	深井専門家携行様材 (本邦購送)
209	- ditto- YAMATO YSD-6	1 set	05/01/89 232- 98041484	SAND TESTING ROOM	JAMIL	SERVICEABLE	¥12,800.-	深井専門家携行様材 (本邦購送)
210	SAND 40 kgs/1 pack	2 packs	05/01/89 232- 98041484	SAND TESTING ROOM	JAMIL	SERVICEABLE	¥4,800.-	深井専門家携行様材 (本邦購送)

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R/D NO	NAME OF EQUIPMENT	QUANTITY	ARRIVAL	PLACE	IN CHARGE	CONDITION	PRICE	BUDGET
211	SILICA SAND	13,000 kg	19/02/90 NFA - 015	SAND STORE	JAMIL	SERVICEABLE	¥559,000.-	小堀. 松波町家銀行機材
	ZIRCON SAND	500 kg					¥131,000.-	
	SHELL SAND	300 kg					¥26,100.-	
	GREEN SAND	2,000 kg					¥36,000.-	
	SODIUM SILICATE	800 kg					¥120,000.-	
	CARBON POWDER	200 kg					¥45,000.-	
	BENTONITE	100 kg					¥11,500.-	
	PARTING POWDER	18 L					¥10,440.-	
	PARTING POWDER	10 L					¥18,500.-	
	CHILLER COAT	5 kg					¥5,780.-	
	FACING MATERIAL	18 kg					¥14,130.-	
	FILTER ( 40 φ x 5t )	100 pcs					900.-	
	FILTER ( 55 φ x 10t )	100 pcs					¥11,500.-	
	ADHESIVE CORE FIX	5 pcs					¥1,850.-	
	IRON OXIDE ( Fe <sub>2</sub> O <sub>3</sub> )	100 kg					¥34,500.-	
	WOOD POWDER	50 kg					¥8,950.-	
	STARCH	20 kg					¥13,860.-	
	RESIN	30 kg					¥26,310.-	
	CATALYST	15 kg					¥7,980.-	

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R/D NO	NAME OF EQUIPMENT	QUANTITY	ARRIVAL	PLACE	IN CHARGE	CONDITION	PRICE	BUDGET
301	CORE MAKING CORE BLOWING MACHINE ( S80-3C ) SUPPER BLOW	1 set	06/12/89 NPK - 002	MOULDING SECTION	JAMIL	SERVICEABLE	¥3,200,000.-	昭和63年度供与器材 (本邦赠送)
302	SHELL MOLDING MACHINE TYPE, ID - 330	1 set	06/12/89 NPK - 002	MOULDING SECTION	JAMIL	SERVICEABLE	¥6,200,000.-	昭和63年度供与器材 (本邦赠送)
303	CORE BOX FOR CORE BLOWING MACHINE CORE BOX FOR SHELL CORE MACHINE	1 set 1 set	19/10/89	MOULDING SECTION MOULDING SECTION	JAMIL JAMIL	SERVICEABLE SERVICEABLE	¥500,000.- ¥1,200,000.-	昭和63年度供与器材 (本邦赠送)



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R/D NO	NAME OF EQUIPMENT	QUANTITY	ARRIVAL	PLACE	IN CHARGE	CONDITION	PRICE	BUDGET
4	SAND PREPARATION ( CO <sub>2</sub> & ORGANIC SAND )							
401	CO <sub>2</sub> SELF - SETTING SAND PLANT BUCKET ELEVATOR ( WITH GRATE HOPPER )	1 set	06/12/89 NPK - 002	MOULDING SECTION	JAMIL	SERVICEABLE	¥18,200,000.-	昭和63年度供与素材 (本部赠送)
402	SAND HOPPER ( WITH BELT CONVEYER )	1 set	06/12/89 NPK - 002	MOULDING SECTION	JAMIL	SERVICEABLE		
403	MIXER CONTROL PANEL	1 set 1 set	06/12/89 NPK - 002	MOULDING SECTION	JAMIL	SERVICEABLE		
404	DUST COLLECTOR	1 set	06/12/89 NPK - 002	MOULDING SECTION	JAMIL	SERVICEABLE		
405	( GREEN SAND ) GREEN SAND PLANT SHARE OUT MACHINE ( WITH HOOD )	1 set	06/12/89 NPK - 002	MOULDING SECTION	JAMIL	SERVICEABLE	¥28,700,000.-	昭和63年度供与素材 (本部赠送)
406	BELT CONVEYER ( WITH MAGNET PULLEY AND MAGNET SEPARATOR )	1 set	06/12/89 NPK - 002	MOULDING SECTION	JAMIL	SERVICEABLE		
407	BUCKET ELEVATOR	1 set	06/12/89 NPK - 002	MOULDING SECTION	JAMIL	SERVICEABLE		
408	SAND HOPPER BELT CONVEYER	1 set	06/12/89 NPK - 002	MOULDING SECTION	JAMIL	SERVICEABLE		
409	MIXER ( WITH TURN CONVEYER ) CONTROL PANEL	1 set	06/12/89 NPK - 002	MOULDING SECTION	JAMIL	SERVICEABLE		
410	DUST COLLECTOR ACCESSORY AND SPARE PARTS	1 set	06/12/89 NPK - 002	MOULDING SECTION	JAMIL	SERVICEABLE		
411	SAND DRYER	1 unit	15/01/90 YPK - 008	MOULDING SECTION	JAMIL	SERVICEABLE	¥5,610,000.-	昭和63年度供与素材 (本部赠送)
	POWER HEATER	1 unit	15/01/90	MOULDING SECTION	JAMIL	SERVICEABLE	¥10,340,000.-	
	HOT AIR GENERATOR	1 unit	15/01/90 YPK - 008	MOULDING SECTION	JAMIL	SERVICEABLE	¥6,190,000.-	
	MAIN CONTROL BOX	1 unit	15/01/90 YPK - 008	MOULDING SECTION	JAMIL	SERVICEABLE	¥4,430,000.-	
	BAG FILTER	1 unit	15/01/90 YPK - 008	MOULDING SECTION	JAMIL	SERVICEABLE	¥4,430,000.-	
	SPARE PARTS	1 unit	15/01/90 YPK - 008	STOR	WOND	SERVICEABLE		

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R/D NO	NAME OF EQUIPMENT	QUANTITY	ARRIVAL	PLACE	IN CHARGE	CONDITION	PRICE	BUDGET
5	FINISHING							
501	SHOT BLAST	1 set	05/12/89 NPK - 002	MOULDING SECTION	JAMIL	SERVICEABLE	¥8,000,000.-	昭和63年度供与器材 (本邦製造)
502	DOUBLE HEADS GRINDER MODEL MFG - 20, Dia. 510 mm ROTATION : 1,900 rpm POWER SOURCE : 415V/3ph/50Hz DUST COLLECTOR FOR DOUBLE HEADS GRINDER	1 set	12/08/89 YFK - 08	MOULDING SECTION	JAMIL	SERVICEABLE	¥3,550,000.-	昭和63年度供与器材 (本邦製造)

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R/D NO	NAME OF EQUIPMENT	QUANTITY	ARRIVAL	PLACE	IN CHARGE	CONDITION	PRICE	BUDGET
6	AIR COMPRESSOR etc							
501	AIR COMPRESSOR, MODEL KST15A - 5C ACTUAL DISCHARGE AIR VOLUME 2.4 m <sup>3</sup> /min. POWER SOURCE : 415V/3ph/50Hz	1 set	12/08/89 YPK - 08	OUT SIDE FOUNDRY	FAUZI	SERVICEABLE	¥2,540,000.-	昭和63年度供与资材 (本邦赠送)
502	GENERATOR MODEL : DCA-45SPI	1 set	24/05/89 YPK - 15	OUT SIDE FOUNDRY	FAUZI	SERVICEABLE	¥2,035,000.-	昭和63年度供与资材 (本邦赠送)

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R/D NO	NAME OF EQUIPMENT	QUANTITY	ARRIVAL	PLACE	IN CHARGE	CONDITION	PRICE	BUDGET
7	<u>INSTRUMENTAL ANALYSIS</u>							
701	RIGAKU/FULLY AUTOMATED X-RAY FLUORESCENT SPECTROMETER	1 set	10/11/89 KPK - 24	X-RAY ROOM	LEE	SERVICEABLE	¥25,088,000.-	昭和63年度供与器材 (本邦購送)
2	CUTTING BLADE FOR SAMPLE CUTTER	1 pc	10/11/89 KPK - 24	X-RAY ROOM	LEE	SERVICEABLE	¥23,400.-	昭和63年度供与器材 (本邦購送)
3	GRINDING BELT FOR DOUBLE HED TYPE BELT GRINDER #A80	1 set	10/11/89 KPK - 24	X-RAY ROOM	LEE	SERVICEABLE	¥18,700.-	昭和63年度供与器材 (本邦購送)
4	GRINDING BELT FOR DOUBLE HED TYPE BELT GRINDER #C80	1 set	10/11/89 KPK - 24	X-RAY ROOM	LEE	SERVICEABLE	¥32,700.-	昭和63年度供与器材 (本邦購送)
5	GRINDING WHEEL FOR SAMPLE GRINDER #A46	1 set	10/11/89 KPK - 24	X-RAY ROOM	LEE	SERVICEABLE	¥87,800.-	昭和63年度供与器材 (本邦購送)
6	GRINDING WHEEL FOR SAMPLE GRINDER GC46	1 set	10/11/89 KPK - 24	X-RAY ROOM	LEE	SERVICEABLE	¥87,800.-	昭和63年度供与器材 (本邦購送)
7	SAMPLE PRESSING DIES SD-40	1 set	10/11/89 KPK - 24	X-RAY ROOM	LEE	SERVICEABLE	¥102,800.-	昭和63年度供与器材 (本邦購送)
8	SAMPLE PRESSING DIES AL-40	1 set	10/11/89 KPK - 24	X-RAY ROOM	LEE	SERVICEABLE	¥33,700.-	昭和63年度供与器材 (本邦購送)
9	ALUMINUM CUP ( 500pcs/set )	10 sets	10/11/89 KPK - 24	X-RAY ROOM	LEE	SERVICEABLE	¥205,500.-	昭和63年度供与器材 (本邦購送)
10	SAMPLE HOLDER	2 pcs	10/11/89 KPK - 24	X-RAY ROOM	LEE	SERVICEABLE	¥37,400.-	昭和63年度供与器材 (本邦購送)
11	SAMPLE HOLDER MASK SUS 30mm φ	2 pcs	10/11/89 KPK - 24	X-RAY ROOM	LEE	SERVICEABLE	¥9,400.-	昭和63年度供与器材 (本邦購送)
12	LIQUID SAMPLE HOLDER	1 pc	10/11/89 KPK - 24	X-RAY ROOM	LEE	SERVICEABLE	¥44,900.-	昭和63年度供与器材 (本邦購送)
13	SURFACE FLATTENING JIG	1 pc	10/11/89 KPK - 24	X-RAY ROOM	LEE	SERVICEABLE	¥14,000.-	昭和63年度供与器材 (本邦購送)
14	5 MICRON POLYESTER ROLL SHEET	5 pcs	10/11/89 KPK - 24	X-RAY ROOM	LEE	SERVICEABLE	¥28,500.-	昭和63年度供与器材 (本邦購送)
15	5 MICRON POLYPROPYLENE ROLL SHEET	5 pcs	10/11/89 KPK - 24	X-RAY ROOM	LEE	SERVICEABLE	¥32,700.-	昭和63年度供与器材 (本邦購送)
16	STANDARD SAMPLE SS655-660 (8pcs/set)	2 sets	10/11/89 KPK - 24	X-RAY ROOM	LEE	SERVICEABLE	¥1,852,900.-	昭和63年度供与器材 (本邦購送)
17	STANDARD SAMPLE CTIFI-8 (8pcs/set)	2 sets	10/11/89 KPK - 24	X-RAY ROOM	LEE	SERVICEABLE	¥523,000.-	昭和63年度供与器材 (本邦購送)

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R/D NO	NAME OF EQUIPMENT	QUANTITY	ARRIVAL	PLACE	IN CHARGE	CONDITION	PRICE	BUDGET
18	STANDARD SAMPLE CUTFOI-FT-3	28 pcs	10/11/89 KPK - 24	X-RAY ROOM	LEE	SERVICEABLE	¥116,200.-	昭和63年度供与振材 (本邦赠送)
19	AUTOTRANSFORMER 10KV1A φ	1 set	10/11/89 KPK - 24	X-RAY ROOM	LEE	SERVICEABLE	¥87,800.-	昭和63年度供与振材 (本邦赠送)
20	AUTOTRANSFORMER 5KV3A φ	1 set	10/11/89 KPK - 24	X-RAY ROOM	LEE	SERVICEABLE	¥140,500.-	昭和63年度供与振材 (本邦赠送)
21	AUTOTRANSFORMER 10KV3A φ	1 set	10/11/89 KPK - 24	X-RAY ROOM	LEE	SERVICEABLE	¥191,500.-	昭和63年度供与振材 (本邦赠送)
22	SPARE AND CONSUMABLE PARTS	1 set (170 pcs)	10/11/89 KPK - 24	X-RAY ROOM	LEE	SERVICEABLE	¥304,500.-	昭和63年度供与振材 (本邦赠送)
23	SAMPLE CUTTER WITH DIST COLLECTING SYSTEM	1 set	10/11/89 KPK - 24	X-RAY ROOM	LEE	SERVICEABLE	¥588,500.-	昭和63年度供与振材 (本邦赠送)
24	VIBRATION MILL WITH TUNGSTEN CARBIDE VESSEL	1 set	10/11/89 KPK - 24	X-RAY ROOM	LEE	SERVICEABLE	¥2,907,000.-	昭和63年度供与振材 (本邦赠送)
25	AUTOMATIC HYDRAULIC PRESS 50 TON	1 set	10/11/89 KPK - 24	X-RAY ROOM	LEE	SERVICEABLE	¥1,595,000.-	昭和63年度供与振材 (本邦赠送)
26	DUST COLLECTING MACHINE	1 set	10/11/89 KPK - 24	X-RAY ROOM	LEE	SERVICEABLE	¥840,600.-	昭和63年度供与振材 (本邦赠送)
27	AIR COOLING SYSTEM HEAT EXCHANGER	1 set	10/11/89 KPK - 24	X-RAY ROOM	LEE	SERVICEABLE	¥1,448,000.-	昭和63年度供与振材 (本邦赠送)
28	DOUBLE HEAD SYSTEM BELT GRINDER	1 set	10/11/89 KPK - 24	X-RAY ROOM	LEE	SERVICEABLE	¥420,300.-	昭和63年度供与振材 (本邦赠送)
29	SAMPLE GRINDER WITH DRESSOR AND GRINDING WHEEL	1 set	10/11/89 KPK - 24	X-RAY ROOM	LEE	SERVICEABLE	¥654,000.-	昭和63年度供与振材 (本邦赠送)
30	FLEXIBLE PIPE	1 set	10/11/89 KPK - 24	X-RAY ROOM	LEE	SERVICEABLE	¥326,900.-	昭和63年度供与振材 (本邦赠送)
31	PR GAS CYLINDER	1 set	10/11/89 KPK - 24	X-RAY ROOM	LEE	SERVICEABLE	¥176,000.-	昭和63年度供与振材 (本邦赠送)
32	SPARE PARTS AUTOMATIC X-RAY SPECTROMETER SYSTEM 3070E/S	147 sets	10/11/89 KPK - 24	X-RAY ROOM	LEE	SERVICEABLE	¥338,210.-	昭和63年度供与振材 (本邦赠送)
33	AIR COOLING TYPE HEAT EXCHANGER (4853B1)	9 pcs	10/11/89 KPK - 24	X-RAY ROOM	LEE	SERVICEABLE	¥271,070.-	昭和63年度供与振材 (本邦赠送)
34	AUTOMATIC X-RAY SPECTROMETER SYSTEM 3070E/S	14 pcs	10/11/89 KPK - 24	X-RAY ROOM	LEE	SERVICEABLE	¥135,220.-	昭和63年度供与振材 (本邦赠送)

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R/D NO	NAME OF EQUIPMENT	QUANTITY	ARRIVAL	PLACE	IN CHARGE	CONDITION	PRICE	BUDGET
702 1	CARBON SULFUR DETERMINATOR MODEL : CS - 244	1 set	12/08/89 YPK - 08	X-RAY ROOM	LEE	SERVICEABLE	¥13,482,120.-	昭和63年度供与器材 (本邦赠送)
2	VOLTAGE REGULATOR (5KVA)	1 set	12/08/89 YPK - 08	X-RAY ROOM	LEE	SERVICEABLE	¥230,000.-	昭和63年度供与器材 (本邦赠送)
3	TRANSFORMER (5KVA)	1 set	12/08/89 YPK - 08	X-RAY ROOM	LEE	SERVICEABLE	¥140,000.-	昭和63年度供与器材 (本邦赠送)
4	OXYGEN REGULATOR	1 set	12/08/89 YPK - 08	X-RAY ROOM	LEE	SERVICEABLE	¥30,000.-	昭和63年度供与器材 (本邦赠送)
5	NITROGEN REGULATOR	1 set	12/08/89 YPK - 08	X-RAY ROOM	LEE	SERVICEABLE	¥30,000.-	昭和63年度供与器材 (本邦赠送)
6	CONSUMABLES PARTS	8 boxes 188 pcs	12/08/89 YPK - 08	X-RAY ROOM	LEE	SERVICEABLE	¥2,186,280.-	昭和63年度供与器材 (本邦赠送)

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R/D NO	NAME OF EQUIPMENT	QUANTITY	ARRIVAL	PLACE	IN CHARGE	CONDITION	PRICE	BUDGET
8 801	PHYSICAL TEST CE METER MODEL : EH100-01 WITH STANDARD ACCESSARY PAPER TRANSFORMER 1 LOT SI CUP G 200 W	1 unit	24/05/89 YPK - 15	MELTING SECTION	MOHD AKHIR	SERVICEABLE	¥1,323,000.-	昭和63年度供与器材 (本邦製造)
802	THERMOMETER MODEL : MSP - 203 ( R ) WITH STANDARD ACCESSARY	1 set	24/05/89 YPK - 15	MELTING SECTION	MOHD AKHIR	SERVICEABLE	¥373,000.-	昭和63年度供与器材 (本邦製造)
803	AL FAITH MODEL : DP-MK II WITH STANDARD ACCESSARY	1 set	24/05/89 YPK - 15	X-RAY ROOM	LEE	SERVICEABLE	¥4,156,000.-	昭和63年度供与器材 (本邦製造)
804	DIGITAL THERMOMETER	1 set	31/03/89	MELTING SECTION	MOHD AKHIR	SERVICEABLE	¥294,000.-	正本専門家携行器材 (本邦製造)

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R/D NO	NAME OF EQUIPMENT	QUANTITY	ARRIVAL	PLACE	IN CHARGE	CONDITION	PRICE	BUDGET
9	SAND TEST							
901	SINDO-SIMPSON LABORATORY MIX-MULLER MODEL MSF-0L	1 set	19/10/89 YPK - 16	SAND TEST	JAWIL	SERVICEABLE	¥1,320,000.-	昭和63年度供与器材 (本邦赠送)
902	MIXER MODEL MSU-1	1 set	19/10/89 YPK - 16	SAND TEST	JAWIL	SERVICEABLE	¥2,340,000.-	昭和63年度供与器材 (本邦赠送)
903	SAND RAMMER FOR SAND SPECIMEN MODEL SR	1 set	19/10/89 YPK - 16	SAND TEST	JAWIL	SERVICEABLE	¥203,600.-	昭和63年度供与器材 (本邦赠送)
904	RO-TAP SIEVE SHAKER MODEL SS WITH SAND TESTING SIEVES MODEL STS	1 set	19/10/89 YPK - 16	SAND TEST	JAWIL	SERVICEABLE	¥814,000.- ¥203,600.-	昭和63年度供与器材 (本邦赠送)
905	ROTATING SAND WASHER MODEL SW	1 set	19/10/89 YPK - 16	SAND TEST	JAWIL	SERVICEABLE	¥458,000.-	昭和63年度供与器材 (本邦赠送)
906	PERCOLABILITY TESTER MODEL PT	1 set	19/10/89 YPK - 16	SAND TEST	JAWIL	SERVICEABLE	¥305,000.-	昭和63年度供与器材 (本邦赠送)
907	MOTOR-DRIVEN UNIVERSAL SAND STRENGTH MACHINE MODEL US-M WITH US-A	1 set	19/10/89 YPK - 16	SAND TEST	JAWIL	SERVICEABLE	¥1,015,000.-	昭和63年度供与器材 (本邦赠送)
908	INFRARED MOISTURE METER MODEL F-2B	1 set	19/10/89 YPK - 16	SAND TEST	JAWIL	SERVICEABLE	¥407,200.-	昭和63年度供与器材 (本邦赠送)
909	GREEN HARDNESS TESTER B SCALE 473	1 set	19/10/89 YPK - 16	SAND TEST	JAWIL	SERVICEABLE	¥78,300.-	昭和63年度供与器材 (本邦赠送)
910	CORE HARDNESS TESTER NO.674	1 set	19/10/89 YPK - 16	SAND TEST	JAWIL	SERVICEABLE	¥152,700.-	昭和63年度供与器材 (本邦赠送)
911	METHYLENE BLUE CLAY TESTER NO.535-A WITH ULTRASONIC METHYLENE BLUE ACCESSORY NO.536 AND PH METER	1 set	19/10/89 YPK - 16	SAND TEST	JAWIL	SERVICEABLE	¥712,600.-	昭和63年度供与器材 (本邦赠送)
912	MOLDABILITY TESTER WITH TRANSFORMER, TRAY, BRUSH & SIEVE	1 unit	12/08/89 YPK - 08	SAND TEST	JAWIL	SERVICEABLE	¥1,420,000.-	昭和63年度供与器材 (本邦赠送)
913	SAND SURFACE TESTING APPARATUS MODEL : POF	1 unit	12/08/89 YPK - 08	SAND TEST	JAWIL	SERVICEABLE	¥1,115,000.-	昭和63年度供与器材 (本邦赠送)
914	CONTACTILITY MODEL : NS-CBT-2 WITH STANDARD ACCESSARY	1 set	24/05/89 YPK - 15	SAND TEST	JAWIL	SERVICEABLE	¥1,015,000.-	昭和63年度供与器材 (本邦赠送)
915	UNIVERSAL STRENGTH MACHINE MODEL : PFG HIGH PRESSURE GAUGE BREAK JIG	1 unit	12/08/89 YPK - 08	SAND TEST	JAWIL	SERVICEABLE	¥1,422,000.-	昭和63年度供与器材 (本邦赠送)
916	BALANCE MODEL : FR-300 WITH STANDARD ACCESSARY	1 set	24/05/89 YPK - 15	SAND TEST	JAWIL	SERVICEABLE	¥508,000.-	昭和63年度供与器材 (本邦赠送)



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R/D NO	NAME OF EQUIPMENT	QUANTITY	ARRIVAL	PLACE	INCHARGE	CONDITION	PRICE	BUDGET
917	DRYING OVEN, MODEL : DX-41	1 set	12/08/89 YPK - 08	SAND TEST	JAMIL	SERVICEABLE	¥124,200.-	昭和63年度供与器材 (本部購送)
	MUFFLE FURNACE FOR ELECTRIC OVEN	1 set	19/10/89 YPK - 16	SAND TEST	JAMIL	SERVICEABLE	¥407,000.-	昭和63年度供与器材 (本部購送)
918	CO <sub>2</sub> - GASSING CONTROLLER MODEL : P8C	1 set	12/08/89 YPK - 08	SAND TEST	JAMIL	SERVICEABLE	¥203,600.-	昭和63年度供与器材 (本部購送)
919	SURFACE THERMOMETER ANRITSU KEIKI HI-200	1 set	05/01/90 232- 98041484	SAND TEST	JAMIL	SERVICEABLE	¥85,000.-	深井専門家族携行器材 (本部購送)
	SENSOR FOR ABOVE UT-M300 CORD 2 MTS. TYPE K	1 set		SAND TEST	JAMIL	SERVICEABLE	¥36,800.-	深井専門家族携行器材 (本部購送)
	-DITTO- BS-2 CORD 2 MTS. TYPE K	1 set		SAND TEST	JAMIL	SERVICEABLE	¥22,400.-	深井専門家族携行器材 (本部購送)
920	HYDROMETER 7 pcs/set. 16cm. long.	1 set	05/01/90 232- 98041484	SAND TEST	JAMIL	SERVICEABLE	¥32,000.-	深井専門家族携行器材 (本部購送)
921	BALANCE AS-500	1 set	05/01/90 232- 98041484	SAND TEST	JAMIL	SERVICEABLE	¥37,000.-	深井専門家族携行器材 (本部購送)
922	ANALYSER	1 set	05/01/90 232- 98041484	SAND TEST	JAMIL	SERVICEABLE	¥131,100.-	深井専門家族携行器材 (本部購送)
923	MAGNETIC STIRRERS, BATTERY TYPE 0 - 500ml. 50 - 1,000 rpm	1 set	05/01/90 232- 98041484	SAND TEST	JAMIL	SERVICEABLE	¥35,700.-	深井専門家族携行器材 (本部購送)
924	ROTOR TEFLON 40mm.	1 set	05/01/90 232- 98041484	SAND TEST	JAMIL	SERVICEABLE	¥1,380.-	深井専門家族携行器材 (本部購送)

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R/D NO	NAME OF EQUIPMENT	QUANTITY	ARRIVAL	PLACE	IN CHARGE	CONDITION	PRICE	BUDGET
1001	PATTERN MAKING THICKNESS PLANNER MODEL : SX-533 MAKER : IIDA KOGYO CO. LTD.	1 set	19/10/89 YPK - 16	PATTERN MAKING ROOM	FAUZI	SERVICEABLE	¥2,160,000.-	昭和63年度供与器材 (本邦購送)
1002	HAND FEED PLANNER MODEL : EJ-302 MAKER : IIDA KOGYO CO. LTD.	1 set	12/08/89 YPK - 08	PATTERN MAKING ROOM	FAUZI	SERVICEABLE	¥710,000.-	昭和63年度供与器材 (本邦購送)
1003	BAND SAW MODEL : JBS-650 MAKER : JOMAN SEISAKUSYO	1 set	24/05/89 YPK - 15	PATTERN MAKING ROOM	FAUZI	SERVICEABLE	¥940,000.-	昭和63年度供与器材 (本邦購送)
1004	UNIVERSAL DRILLING MACHIN MODEL : EF-40 MAKER : YAMAMOTO CO. LTD.	1 set	12/08/89 YPK - 08	PATTERN MAKING ROOM	FAUZI	SERVICEABLE	¥610,000.-	昭和63年度供与器材 (本邦購送)
1005	WOOD WORKING LATHE MODEL : TF-24 MAKER : FUJIKYU MACHINERY INDUSTRY	1 set	12/08/89 YPK - 08	PATTERN MAKING ROOM	FAUZI	SERVICEABLE	¥2,390,000.-	昭和63年度供与器材 (本邦購送)
1006	WOOD WORKING TOOL GRINDER MODEL : TF MAKER : FUJIKYU MACHINERY INDUSTRY	1 set	12/08/89 YPK - 08	PATTERN MAKING ROOM	FAUZI	SERVICEABLE	¥303,000.-	昭和63年度供与器材 (本邦購送)
1007	ELECTRIC PLANNER MODEL : P-40 MAKER : HITACHI KOKI CO. LTD.  ELECTRIC DRILL MODEL : BUL-SHG MAKER : HITACHI KOKI CO. LTD.  ELECTRIC JIG SAW MODEL : JH-60A MAKER : HITACHI KOKI CO. LTD.  ELECTRIC ORBITAL SANDER MODEL : SV 12VI MAKER : HITACHI KOKI CO. LTD.	1 set 1 set 1 set 1 set	12/08/89 YPK - 08 12/08/89 YPK - 08 12/08/89 YPK - 08 12/08/89 YPK - 08	PATTERN MAKING ROOM PATTERN MAKING ROOM PATTERN MAKING ROOM PATTERN MAKING ROOM	FAUZI FAUZI FAUZI FAUZI	SERVICEABLE SERVICEABLE SERVICEABLE SERVICEABLE	¥52,900.- ¥33,500.- ¥33,500.- ¥40,200.-	昭和63年度供与器材 (本邦購送) 昭和63年度供与器材 (本邦購送) 昭和63年度供与器材 (本邦購送) 昭和63年度供与器材 (本邦購送)
1008	DIAL COUNT HEIGHT GAGE MODEL : H-730N HEIGHT GAGE I MODEL : H-760  ANGLE VISE W/SWIVEL BASE MODEL : P-400AS  BOX PARALLEL MODEL : BP19M SURFACE GAUGE MODEL : NY17-311 SURFACE GAUGE MODEL : NY17-313 SURFACE GAUGE MODEL : NY17-314	1 pc 1 pc 1 pc 1 pc	24/05/89 YPK - 15 24/05/89 YPK - 15 24/05/89 YPK - 15	PATTERN MAKING ROOM PATTERN MAKING ROOM PATTERN MAKING ROOM	FAUZI FAUZI FAUZI	SERVICEABLE SERVICEABLE SERVICEABLE	¥50,900.- ¥14,000.- ¥50,900.- ¥30,500.- ¥4,500.- ¥4,500.- ¥4,500.-	昭和63年度供与器材 (本邦購送) 昭和63年度供与器材 (本邦購送) 昭和63年度供与器材 (本邦購送)

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R/D NO	NAME OF EQUIPMENT	QUANTITY	ARRIVAL	PLACE	IN CHARGE	CONDITION	PRICE	BUDGET
1008	VERNIER CALIPER MODEL : VE-20 VERNIER CALIPER MODEL : VE-30	1 pc 1 pc	24/05/89 YPK - 15	PATTERN MAKING ROOM	FAUZI	SERVICEABLE	¥12,800.- ¥12,800.-	昭和63年度供与器材 (本邦赠送)
	STRAIGHT EDGE 1000mm SQUARE MODEL : OA-150 SQUARE MODEL : OA-300	1 pc	24/05/89 YPK - 15	PATTERN MAKING ROOM	FAUZI	SERVICEABLE	¥21,300.- ¥15,750.- ¥15,750.-	昭和63年度供与器材 (本邦赠送)
	STEEL RULER 300mm STEEL RULER 600mm	1 pc	24/05/89 YPK - 15	PATTERN MAKING ROOM	FAUZI	SERVICEABLE	¥875.- ¥875.-	昭和63年度供与器材 (本邦赠送)
	JACK SCREW MODEL : NO.5 JACK SCREW MODEL : J45	1 pc	24/05/89 YPK - 15	PATTERN MAKING ROOM	FAUZI	SERVICEABLE	¥4,575.- ¥4,575.-	昭和63年度供与器材 (本邦赠送)
1009	SURFACE PLATE MODEL : OS-6060 SURFACE PLATE MODEL : OS-90180	1 pc 1 pc	24/05/89 YPK - 15	PATTERN MAKING ROOM	FAUZI	SERVICEABLE	¥73,300.- ¥305,000.-	昭和63年度供与器材 (本邦赠送)
	ROUTER MACHIN MODEL : RO-116	1 pc	24/05/89 YPK - 15	PATTERN MAKING ROOM	FAUZI	SERVICEABLE	¥1,015,000.-	昭和63年度供与器材 (本邦赠送)
1011	TILTS SAW APINDKE TYPE CIRCULAR SAW BENCH MODEL : ISB-16 MAKER : ISHIZU MANUFACTURING CO. LTD.	1 pc	19/10/89 YPK - 16	PATTERN MAKING ROOM	FAUZI	SERVICEABLE	¥824,000.-	昭和63年度供与器材 (本邦赠送)
1012	ELECTRIC BENCH GRINDER MODEL : ABT-4 WITH FLOOR STAND MAKER : HITACHI KOKI CO. LTD.	1 set	12/08/89 YPK-08	PATTERN MAKING ROOM	FAUZI	SERVICEABLE	¥108,000.-	昭和63年度供与器材 (本邦赠送)
1013	KNIFE GRINDER MODEL MODEL : JG-T60 MAKER : TAKEGAWA IRON CO. LTD.	1 unit	24/05/89 YPK - 15	PATTERN MAKING ROOM	FAUZI	SERVICEABLE	¥895,000.-	昭和63年度供与器材 (本邦赠送)
1014	CARPENTER TOOLS PLANE, BLADE SIZE : 3/4, FINISH PLANE, BLADE SIZE : 3/4, ROUGH PLANE, BLADE SIZE : 3/4, SMALL PLANE, BLADE SIZE : 3/4, LONG DOUBLE-EDGE WOOD SAW, LENGTH : 300mm DOUBLE-EDGE WOOD SAW, LENGTH : 240mm MINTI PLANE, SIZE : 40mm MINTI PLANE, SIZE : 30mm SIDE PLANE FOR LEFT SIZE : 300mm SIDE PLANE FOR RIGHT SIZE : 300mm TRIANGLE GIMLET, REGULAR SQUARE GIMLET, REGULAR JAR GIMLET, SIZE : 9mm JAR GIMLET, SIZE : 6mm WOOD CHISELS FOR FLAT, SIZE : 30mm WOOD CHISELS FOR FLAT, SIZE : 18mm WOOD CHISELS FOR FLAT, SIZE : 9mm WOOD CHISELS FOR ROUND, SIZE : 3.3mm WOOD CHISELS FOR ROUND, SIZE : 3.7mm	2 pcs 1 pc	14/12/89 YPK - 23	PATTERN MAKING ROOM	FAUZI	SERVICEABLE	¥385,450.-	昭和63年度供与器材 (本邦赠送)

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R/D NO	NAME OF EQUIPMENT	QUANTITY	ARRIVAL	PLACE	IN CHARGE	CONDITION	PRICE	BUDGET
1014	CARPENTER TOOLS SMALL TOOLS WITH COVERED KNIVES WHEEL STONE FOR ROUND CHISEL, MEDIUM WHEEL STONE FOR ROUND CHISEL, FINISH BUSH HAMMER, WEIGHT : 300g WOOD CHISELS FOR FLAT - 115g WOOD CHISELS FOR ROUND - 10pcs/set WOOD CHISELS FOR FLAT WITH HANDLE WOOD CHISELS FOR CONVEX WITH HANDLE STEEL BACK PLATE ENERGY POWDER WHEEL STON FOR FINISH WHEEL STON FOR MEDIUM WHEEL STON FOR ROUGH KNIVES DRILL CRUCK, SIZE : 13mm STRAIGHT SHANK DRILL, SIZE : 1-13mm BITS AUGER, SIZE : 6, 9, 12MM EACH-2PCS TIPS SAW, SIZE : 405mm SMALL JACK, TYPE : J-45 MULTI VISE, JAW WIDTH : 150mm	1 set 1 pc 1 pc 1 pc 1 pc 1 set 1 set 1 set 1 pc 1 pc 1 pc 1 pc 1 pc 2 sets 6 pcs 1 pc 4 pc 1 pc	14/12/89 YPK - 23	PATTERN MAKING ROOM	FAUZI	SERVICEABLE		昭和63年度供与器材 (本邦購送)
1015	RUG FILTER DUST COLLECTOR MODEL : NDC - 740P 80m <sup>3</sup> /min. 415V/5.5KW MAKER : NIPPON DUST COLLECTOR	1 set	12/05/89 YPK - 08	PATTERN MAKING ROOM	FAUZI	SERVICEABLE	¥2,560,000.-	昭和63年度供与器材 (本邦購送)
1016	RYOMA PORTABLE BAND SAW MODEL : BSW-200 WITH TRANSFORMER WITH BLADE ( 5X48X3, 120mm) 10PCS	1 set	21/05/90 232- 98041613	PATTERN MAKING ROOM	FAUZI	SERVICEABLE	¥357,200.-	原専門家携行器材 (本邦購送)
1017	A SET SQUARE COMPAS 75, 125, 250, set DISPTCH SURFACE GAUGE 250, 400, set. CHISEL & CLAMP 300mm, 5 pcs/set. MARKING GAUGE BITS 10 pcs/set, PLANE 10 sets HAND SAW FLAT CURVE EDGE EITH HANDLE 10 set PRECISION SQUARES LEVELES 200 X 130mm BEVEL RULER 15cm GRADUATOR	2 pcs 1 set 1 set 1 set 1 set 1 set 1 set 1 set 1 set 1 set 1 set 1 set 2 pcs	05/01/90 232- 98041484	PATTERN MAKING ROOM	FAUZI	SERVICEABLE	¥1,380.- ¥6,100.- ¥9,200.- ¥13,700.- ¥7,590.- ¥1,810.- ¥51,750.- ¥57,000.- ¥4,950.- ¥41,900.- ¥5,180.- ¥1,450.- ¥1,150.-	原専門家携行器材 (本邦購送)

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R/D NO	NAME OF EQUIPMENT	QUANTITY	ARRIVAL	PLACE	IN CHARGE	CONDITION	PRICE	BUDGET
1101	INFORMATION INSTRUMENT COPY MACHINE ( MINOLTA )	1 set	23/03/89	URUSETIA UTF	LINDA	SERVICEABLE	M\$27,300.-	昭和63年度供与機材 (現地調達)
1102	PERSONAL COMPUTER COMPAQ DESKPRO 286 MODEL 40 MS-DOS V3.3 COMPAQ LAPTOP SLIT/286 MODEL 20 INTERNAL MODEN 2400 BAND PRINTER OKI ML 391	1 set 1 set 1 set 1 set 1 set	30/03/89	COMPUTER ROOM	FAUZI	SERVICEABLE	M\$33,859.-	昭和63年度供与機材 (現地調達)
1103	VIDEO SET SONY CCDV200 SONY VIDEO CAMERA XV-C700 SONY COLOR MONITOR KX-21HGI HITACHI VIDEO CASSETTE RECORDER VT-498EM	1 set 1 set 1 set 1 set	15/05/89	VIDEO ROOM	BAKRI	SERVICEABLE	M\$15,432.-	昭和63年度供与機材 (現地調達)
1104	AUTOMATIC VOLTAGE REGULATOR	1 set	20/08/89	X-RAY ROOM	LEE	SERVICEABLE	M\$11,800.-	昭和63年度供与機材 (現地調達)
1105	UNINTERRUPTIBLE POWER SUPPLY ( UPS )	1 set	04/07/89	COMPUTER ROOM	FAUZI	SERVICEABLE	M\$3,500.-	昭和63年度供与機材 (現地調達)
1106	CANON C-335 CANON CW-CF04 CANON CW-HP02	1 set 1 set 1 set	20/07/89	COORDINATOR ROOM	KANAMORI	SERVICEABLE	M\$14,046.-	平成元年年度供与機材 (現地調達)
1107	HITACHI PERSONAL COMPUTER (8-16 EX-41) HITACHI KB 102 KEYBOARD HITACHI DC-244 14" COLOR CRT HITACHI MC-570 1MB RAM HITACHI KS-100 HAND IMAGE SCANNER HITACHI C60 PD-804B KANJI 16"DOT PRINTER HITACHI C60 AS 600 AUTO SHEET FEEDER	1 set 1 set 1 set 1 set 1 set 1 set	10/01/90	COMPUTER ROOM	FAUZI	SERVICEABLE	M\$152,489.80	平成元年年度供与機材 (現地調達)
1108	COPY MACHINE ( MINOLTA EP 4230 )	1 set	28/02/90	COORDINATOR ROOM	KANAMORI	SERVICEABLE	M\$12,000.-	原専門家携行機材 (現地調達)
1109	KODAK CAROUSEL SLIDE PROJECTOR ( SAV 1050 )	1 set	07/03/90	VIDEO ROOM	BAKRI	SERVICEABLE	M\$2,800.-	原専門家携行機材 (現地調達)
1110	COBIN OVERHEAD PROJECTOR ( MODEL : 21 F )	1 set	07/03/90	COMPUTER ROOM	FAUZI	SERVICEABLE	M\$1,900.-	原専門家携行機材 (現地調達)
1111	HP LASER JET SERIES II	1 set	10/03/90	COMPUTER ROOM	FAUZI	SERVICEABLE	M\$11,380.-	原専門家携行機材 (現地調達)
1112	COMPUTER PROJECTION PANEL	1 set	13/03/90	COMPUTER ROOM	FAUZI	SERVICEABLE	M\$3,280.-	原専門家携行機材 (現地調達)

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R/D NO	NAME OF EQUIPMENT	QUANTITY	ARRIVAL	PLACE	IN CHARGE	CONDITION	PRICE	BUDGET
1113	COMPAQ DESKPRO 386/20e COMPUTER SISTEN	1 set	27/02/90	COMPUTER ROOM	FAUZI	SERVICEABLE	MS45,382.-	原專案撥行器材 (現地購運)
	COMPAQ STL/286 MODEL 40 LAPTOP COMPUTER C/W	1 set	22/03/90	COMPUTER ROOM	FAUZI	SERVICEABLE		
1114	WORD PROCESSOR CANONWORD 4100, CANON WITH PRINTER, TRANSFORMER, PULG	1 set	21/03/90 232- 98041613	CHIEF ADVISOR ROOM	HARA	SERVICEABLE	¥903,000.-	原專案撥行器材 (本項購運)

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R/D NO	NAME OF EQUIPMENT	QUANTITY	ARRIVAL	PLACE	IN CHARGE	CONDITION	PRICE	BUDGET
12	VEHICLE							
1201	MINIBUS MERCEDES 03090/35	1 unit	15/07/89	ADMINISTRATION	YUSOF	SERVICEABLE	MS108,155.80	昭和63年度供与器材 (現地調達)
1202	LAND CRUISER MITSUBISHI ( PAJERO )	1 unit	31/01/90	ADMINISTRATION	JALIL	SERVICEABLE	MS52,746.11	平成元年度供与器材 (現地調達)

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R/D NO	NAME OF EQUIPMENT	QUANTITY	ARRIVAL	PLACE	IN CHARGE	CONDITION	PRICE	BUDGET
13	BOOK TYUTEISU YOKAI HAND BOOK ( NIHON IMONO KYOKAI )	1	31/03/89	CHIEF ADVISOR ROOM	KAWAMORI		¥8,800.-	正本専門家誘行資料 (本部購送)
1302	TYUTEISU YOKAI HAND BOOK ( NIHON IMONO KYOKAI )	1	19/07/89	CHIEF ADVISOR ROOM	KAWAMORI		¥8,800.-	原専門家誘行資料 (本部購送)
3	IMONO BINRAN ( KAITEI 4 HAN ) ( NIHON IMONO KOUGYOKAI )	1	19/07/89				¥32,000.-	
4	TYUTEISU NO ZAISHITSU ( NIHON IMONO KOUGYOKAI )	1	19/07/89				¥5,700.-	
5	KINZOKU ZAIRYO DATA BOOK ( NIHON KIKAKU KYOKAI )	1	19/07/89				¥2,900.-	
6	JIS HAND BOOK #1 TETSUROU ( NIHON KIKAKU KYOKAI )	1	19/07/89				¥5,260.-	
7	JIS HAND BOOK #2 HITEISU ( NIHON KIKAKU KYOKAI )	1	19/07/89				¥4,430.-	
8	JIS HAND BOOK #10 KOUICAI ( NIHON KIKAKU KYOKAI )	1	19/07/89				¥5,880.-	
9	JIS HAND BOOK #21 ANZEN ( NIHON KIKAKU KYOKAI )	1	19/07/89				¥4,600.-	
10	JIS HAND BOOK #22 YUATU-KUATU ( NIHON KIKAKU KYOKAI )	1	19/07/89				¥4,950.-	
11	JIS HAND BOOK #1 KINZOKUBUNSEKI ( NIHON KIKAKU KYOKAI )	1	19/07/89				¥4,950.-	
12	TYUTEISU IMONO TYOUZOUHOUAN NO KANGAKATA ( NIHON IMONO KOUGYOKAI )	1	19/07/89				¥4,400.-	
13	IMONO ZOUKEI-GIZYUTU NO YOUTEN ( NIHON IMONO KOUGYOKAI )	1	19/07/89				¥1,500.-	
1303	IGATA ZOKEIHOU ( TYUZOFUKUYOKAI )	1	19/07/89	CHIEF ADVISOR ROOM	KAWAMORI		¥12,000.-	深井専門家誘行資料 (本部購送)
14	TETUKOBINRAN KISO ( AARUZEN )	1	05/01/90				¥28,000.-	
15	TETUKOBINRAN ZONEI ( AARUZEN )	1	05/01/90				¥19,000.-	
16	KINZOKU DATA BOOK ( NIHON KIKAKU KYOKAI )	1	05/01/90				¥7,500.-	



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R/D NO	NAME OF EQUIPMENT	QUANTITY	ARRIVAL	PLACE	IN CHARGE	CONDITION	PRICE	BUDGET
1304 1	H. T. ANGUS Cast iron physical and engineering properties.	1	91/03/90 09/03/90	STORE	LEE		M\$562.80	平成元年年度供与機材 (理地編造)
2	R. C. HURST Design of high temperature metallic components.	1					M\$142.89	
3	P. MARSHALL Austenitic stainless steels. Microstructure and mechanical properties.	1					M\$233.82	
4	P. R. BEELEY Foundry technology	1					M\$289.28	
5	P. D. WEBSTER Fundamentals of foundry technology.	1					M\$305.52	
6	I. MINKOFF The physical metallurgy of cast iron.	1					M\$247.47	
7	M. A. J. RIGAUD Proceedings of the Intl Symposium on advances in refractories for the metallurgical industries.	1					M\$202.64	
8	MICHAEL B. BEVER Encyclopedia of materials science and engineering Vols. 1 to 8 set.	1					M\$7,236.00	
9	FREDERICK HAYES ROTH Building exper systems.	1					M\$142.31	
10	W. BURKART Grinding and polishing Theory and practice.	1					M\$308.74	
11	V. GUTTMANN Corrosion and mechanical stress at high temperatures.	1					M\$255.47	
12	PAUL A. SAND Advanced PASCAL Programming techniques	1					M\$70.59	
13	MICHAEL F. ASIBY Engineering materials 1 - An introduction to their properties and applications.	1					M\$157.23	
14	D. F. ALLSOP Pressure diecasting Part 2.	1					M\$115.78	

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R/D NO	NAME OF EQUIPMENT	QUANTITY	ARRIVAL	PLACE	IN CHARGE	CONDITION	PRICE	BUDGET
15	O. VAN DER BIEST Analysis of high temperature materials.	1	01/03/90 09/03/90	STORE	LEE		¥\$160.21	平成元年度供与器材 (現地調達)
16	MAHQUD M. FARAG Materials and process selection in engineering.	1					¥\$203.51	
17	B. T. KELLY Physics of graphite.	1					¥\$324.75	
18	ERWIN PLOCKINGER Electric furnace steel production.	1					¥\$610.88	
19	JAMES E. SOPCAK Handbook of lost wax or investment casting.	1					¥\$112.56	
20	VITO J. COLANGELO Analysis of metallurgical failures.	1					¥\$160.64	
21	CHRISTIAN The theory of transformations in metals and alloys PART I.	1					¥\$286.22	
22	J. B. MARRIOTT High temperature alloys - their exploitable potential.	1					¥\$259.80	
23	HOWARD E. BOYER Atlas of stress strain curves.	1					¥\$411.65	
24	BETZALEL AVITZUR Handbook of metal forming processes	1					¥\$369.84	
25	GEORGE E. DIETER Mechanical metallurgy.	1					¥\$35.44	
26	I. MINKOFF Solidification and cast structure.	1					¥\$208.88	
27	P. N. RAO Manufacturing technology.	1					¥\$28.73	
28	GUIDE TO MATERIALS ENGINEERING DATA AND INFORMATION.	1					¥\$225.12	
29	DAVID F. ROGERS Techniques for computer graphics.	1					¥\$195.96	
30	G. KATEMAN Quality control in analytical chemistry.	1					¥\$218.69	

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31	YOSHISADA OGINO Catalysis and surface properties of liquid metal and alloys.	1	01/03/90 09/03/90	STORE	LEE	SERVICEABLE	¥288.10	平成元年産供与器材 (現地調達)
32	ARTHUR C. STREET The diecasting book.	1					¥305.52	
33	SIMS/STOLOFF/HAGEL Superalloys II: High temperature materials for aerospace and industrial power.	1					¥223.51	
34	E. HERRMANN Handbook on continuous casting.	1					¥1,888.40	
35	JOHN GAY Cast iron.	1					¥44.86	
36	THE FOSECO FOUNDRYMAN'S HANDBOOK, 9TH ED.	1					¥176.88	
37	L. COUBURIER Fundamentals of metallurgical processes.	1					¥254.06	
38	R. D. WALKER Small scale steelmaking.	1					¥125.57	
39	M. F. ASHBY Perspectives in hydrogen in metals.	1					¥353.76	
40	HERT TREATMENT '87 LONDON MAY 1987.	1					¥225.12	
41	HERT TREATMENT '87	1					¥218.69	
42	HERT TREATMENT SANGHAI '83	1					¥308.74	
43	SOLIDIFICATION TECHNOLOGY IN THE FOUNDRY AND CASTHOUSE.	1					¥353.76	
44	R. I. L. GUTHRIE Engineering in process metallurgy.	1					¥315.17	
45	R. C. KRUTENAT Metallurgical coatings 1987- VOLT 1 to 4	4					¥1,372.61	
46	V. SEDLACEK Non ferrous metals and alloys.	1					¥384.30	
47	P. T. HOULDCROFT Materials data sources.	1					¥51.96	
48	J. H. CHESTERS Refractories - Production and properties.	1					¥150.80	

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49	P. L. JAIN Principles of foundry technology	1	01/03/90	STORE	LEE	SERVICEABLE	¥18.30	平成元年度供与機材 (現地調達)
50	D. N. NANDI Handbook of refractories.	1					¥52.93	
51	P. L. JAIN Foundry patterns - Design and manufacture.	1					¥42.89	
52	R. W. COCHRANE Rapidly quenched metals 6-VOLS. 1-3 3 VOLS.	3					¥1,082.50	
53	INTERPRETING ENGINEERING DRAWINGS. INSTRUCTOR'S GUIDE.	1					¥25.57	
54	LARRY JEFFUS Welding principles and applications. Instructor's guide.	1					¥24.12	
55	LARRY JEFFUS Welding principles and applications.	1					¥180.82	
56	R. G. KING Surface treatment and finishing of aluminium	1					¥128.64	
57	K. H. PRADHUEY' Handbook of heat treatment of steels.	1					¥142.33	
58	MICHAEL EDELHART The Brady book of turbo pascal.	1					¥54.16	
59	T. J. SMITH Modelling the flow and solidification of metals.	1					¥207.90	
60	PHILIP KLAHR Expert systems, Techniques, tools, and applications.	1					¥131.69	
61	LARRY KERSCHBERG Expert database systems.	1					¥155.98	
62	EDWARD G. HOFFMAN Jig and fixture design.	1					¥60.94	
63	DAVID L. GOETSCH Structural drafting.	1					¥86.67	
64	RUDOLF O. MULLER Spectrochemical analysis by X-ray fluorescence.	1					¥176.88	

Equipment List / Foundry Technology Unit

R/D NO	NAME OF EQUIPMENT	QUANTITY	ARRIVAL	PLACE	IN CHARGE	CONDITION	PRICE	BUDGET
65	J. S. PLEN Introduction to fluorescence microscopy	1	01/03/90 09/03/90	STORE	LEE	SERVICABLE	¥525.72	平成元年底供与器材 (理也振込)
66	LARRY JOEL GOLDSTEIN Advanced BASIC for the IBM PC and compatibles : Tape Aard techniques.	1					¥5160.64	
67	RON JENKINS X-ray fluorescence spectrometry	1					¥4209.04	
68	R. A. EARNSHAW Geometric modelling and computer graphics. Techniques and applications.	1					¥5321.60	
69	S. S. RAO The finite element method in engineering.	1					¥5221.90	
70	D. N. CRYTHER Heat transfer fields & refractories fluid flow in furnace technology.	1					¥572.04	
71	M. YUSSOUFF Current trends in the physics of materials.	1					¥5215.47	
72	PETER JACKSON Introduction to expert systems.	1					¥575.50	
73	PAUL F. HOGAN Modelling and simulation on microcomputers 1987.	1					¥590.05	
74	ROBERT HAWKINS Tools for the simulation profession.	1					¥551.46	
75	KNUD ERIK WICHMANN / JOHANNES RETTI Simulation in computer integrated techniques	1					¥596.48	
76	RICHARD K. MILLER Artificial intelligence applications in manufacturing.	1					¥5424.51	
77	M. A. J. RIGAUD Proceedings of the International Symposium on advances in refractives for the metallurgical industries vol. 4.	1					¥5192.96	
78	DONALD V. BROWN Basic metallurgy.	1					¥548.24	
79	M. ZANDI Computer aided design & drafting.	1					¥580.24	

Equipment List / Foundry Technology Unit

R/D NO	NAME OF EQUIPMENT	QUANTITY	ARRIVAL	PLACE	IN CHARGE	CONDITION	PRICE	BUDGET
80	GARY R. BERTOLINE Fundamentals of CAD.	1	01/03/90 09/03/90	STORE	LEE	SERVICEABLE	MS77.02	平成元年度供与撥材 (現地調達)
81	ROBERT E. SKALLWOOD Refractory metals and their industrial applications.	1					MS61.10	
82	BEHAL / MELILLI Stainless steel castings.	1					MS144.72	
83	MSBEIT / MELILLI Steel forgings.	1					MS189.74	
84	BALDIR S. DHILLON Quality, control, reliability and engineering design.	1	13/03/90 30/03/90	STORE	LEE	SERVICEABLE	MS223.78	平成元年度供与撥材 (現地調達)
85	HAROLD L. GILMORE Integrated product testing and evaluation.	1					MS159.45	
86	ROBERT M. EASTMAN Materials handling.	1					MS268.10	
87	ROBERT M. BETHEA Statistical methods for engineers and scientists.	1					MS173.66	
88	RALPH J. HARRISON Artificial intelligence applications in materials science.	1					MS180.10	
89	DON M. INGELS What every engineer should know about computer modeling and simulation.	1					MS112.56	
90	RONARD L. HUSTON Finite element methods - An introduction.	1					MS151.35	
91	WILLIAM D. ENGELKE How to integrate CAD/CAM systems.	1					MS241.20	
92	H. K. HERGLITZ X-ray spectrometry.	1					MS369.64	
93	ULRICH REINOLD Interface technology for computer controlled manufacturing processes.	1					MS223.78	
94	WHAT EVERY ENGINEER SHOULD KNOW ABOUT ARTIFICIAL INTELLIGENCE.	1					MS80.70	

Equipment List / Foundry Technology Unit

R/D NO	NAME OF EQUIPMENT	QUANTITY	ARRIVAL	PLACE	IN CHARGE	CONDITION	PRICE	BUDGET
95	THE PRACTICAL FOUNDRYMAN'S GUIDE TO FEEDING & RUNNING GRAY C. G. & S. G. CASTINGS.	1	13/03/90 30/03/90	STORE	LEE	SERVICEABLE	¥5232.42	平成元年度供与器材 (現地調達)
96	FUNDAMENTALS CORE TECHNOLOGY.	1					¥596.84	
97	METAL CASTING DICTIONARY.	1					¥564.56	
98	COST ACCOUNTING.	1					¥5193.68	
99	GUIDE TO SAND ADDITIVES.	1					¥5129.12	
100	FOUNDRY ENERGY MANAGEMENT.	1					¥5290.52	
101	SHELL PROCESS FOUNDRY PRACTICE.	1					¥5161.40	
102	FURAN RESIN AIRSET SAND.	1					¥532.28	
103	CUPOLA HANDBOOK.	1					¥5387.36	
104	DUCTILE IRON WOLLEN PROCESS.	1					¥5129.12	
105	CASTING COPPER BASE ALLOYS.	1					¥5235.96	
106	BASIC PRINCIPLES OF RISERING.	1					¥596.84	
107	BASIC PRINCIPLES OF GATING.	1					¥596.84	
108	MOLD & CORE COATINGS MANUAL.	1					¥5129.12	
109	INTERNATIONAL ATLAS OF CASTING.	1					¥5129.12	
110	GRAPHITE FLOTATION IN DUCTILE IRO.	1					¥54.56	
111	GREEN SAND ADDITIVES.	1					¥5129.12	
112	WAX BINDER & SLURRY TEST HANDBOOK.	1					¥558.24	
113	INVESTMENT CASTING WAXES.	1					¥5161.40	
114	SHELL CRACKING.	1					¥5129.12	
115	GRAY IRON MICROSTRUCTURE RATING CHART.	1					¥32.28	
116	FOUNDRYMAN'S GUIDE TO DUCTILE IRON MICROSTRUCTURES.	1					¥5161.40	
117	FUNDAMENTAL MOLDING SAND TECHNOLOGY.	1					¥596.84	
118	FOUNDRY HEALTH & SAFETY GUIDE.	1					¥5193.68	
119	PATTERN MAKING.	1					¥596.84	

Equipment List / Foundry Technology Unit

R/D NO	NAME OF EQUIPMENT	QUANTITY	ARRIVAL	PLACE	IN CHARGE	CONDITION	PRICE	BUDGET
120	PATTERN MAKER'S MANUAL.	1	13/03/90	STORE	LEE	SERVICEABLE	MS322.80	平成元年渡供与様材 (現地調達)
121	DUCTILE IRON MICROSTRUCTURE RATING CHART.	1	30/03/90				MS32.28	
122	COST ACCOUNTING METHOD FOR IRON FOUNDRIES.	1					MS48.42	
123	PLASTER MOLD HANDBOOK.	1					MS28.89	
124	HISTORY CAST IN METAL.	1					MS96.84	
125	CUPOLA OPERATIONS GUIDE.	1					MS38.74	
126	STEEL CASTING HANDBOOK.	1					MS112.98	
127	PROCEEDINGS OF THE AFS/CFI CONF. ON THERMAL ANALYSIS OF MOLTEN ALUMINUM.	1					MS161.40	
128	THE KEY MINIMUM MAXIMUM STANDARDS PROCESS CONTROL SYSTEM.	1					MS161.40	
129	THE RECIRCULATION OF AIR FOR ENERGY CONSERVATION IN ENGINEERING GUIDELINES.	1					MS96.84	
130	BASIC PRINCIPLES OF METALLURGY VOL.1	1					MS96.84	
131	CONFERENCE ON CLEANING ROOM TECHNOLOGY.	1					MS64.56	
132	CONFERENCE ON CUPOLA OPERATIONS.	1					MS64.56	
133	CORELESS INDUCTION FURNACE TYPE.	1					MS32.28	
134	FOUNDRY VENTILATION MANUAL	1					MS193.68	
135	PROCEEDINGS OF AFS/CFI FOUNDRY MAINT. CONF.	1					MS64.56	
136	CORELESS FURNACE POWER SYSTEM.	1					MS32.28	
137	METALCASTER'S REFERENCE GUIDE.	1					MS290.52	
138	PRINCIPLES OF SHELL PROCESS.	1					MS96.84	
139	INDUSTRIAL ENGINEERING IN THE FOUNDRY.	1					MS225.96	
140	CUPOLA MELTING SYSTEM SELECTIONS.	1					MS32.28	
141	CLEANING CASTINGS	1					MS129.12	
142	ENERGY & THE FOUNDRY.	1					MS32.28	
143	NIXEL AS AN ALLOY IN CAST IRON.	1					MS32.28	
144	BASIC PRINCIPLES OF METALLURGY VOL. 2	1					MS96.84	



Equipment List / Foundry Technology Unit

R/D NO	NAME OF EQUIPMENT	QUANTITY	ARRIVAL	PLACE	IN CHARGE	CONDITION	PRICE	BUDGET
145	CUPOLA MELTING VOL. I	1	13/03/90	STORE	LEE	SERVICEABLE	M\$96.84	平成元年年度供与器材 (現地調達)
146	CUPOLA MELTING VOL. II	1	30/03/90				M\$96.84	
147	FINISHING CASTINGS IN THE CLEANING ROOM	1					M\$96.84	
148	GUIDELINES FOR DEVELOPING NATURAL GAS REDUCTION PHASEOUT PLANS FOR FOUNDRIES.	1					M\$32.28	
149	HOT TEAR CONTROL HANDBOOK FOR ALUMINIUM FOUNDRIES AND CASTING DESIGNERS.	1					M\$32.28	
150	INDUSTRIAL NOISE CONTROL.	1					M\$193.68	
151	INTRODUCTION TO CAST METALS INDUSTRY.	1					M\$96.84	
152	CORE & MOLD PROCESS CONTROL.	1					M\$129.12	
153	RISER.	1					M\$2,098.20	
154	LEAST COST CHARGE.	1					M\$2,098.20	
155	GATING OF STEEL.	1					M\$2,098.20	
156	GATING OF IRON.	1					M\$2,098.20	
157	CUPOLA OPERATIONS EVAL.	1					M\$2,582.40	
158	PROGRAMMED LEARNING SERIES OF #13 TEXTBOOKS.	1					M\$807.00	
159	METHODS FOR MODERN SCULPTORS.	1					M\$51.45	
160	PATTERNMAKERS GUIDE.	1					M\$321.60	
161	DUCTILE IRON PRODUCTION PRACTICES.	1					M\$160.80	
162	ANALYSIS OF CASTING DEFECTS.	1					M\$192.96	
163	PRINCIPLES OF INDUCTION MELTING.	1					M\$26.11	
164	CASTING DEFECTS HANDBOOK.	1					M\$128.64	
165	CAST METALS TECHNOLOGY.	1					M\$86.82	
166	METAL CASTING & WELDING PROCESSES.	1	30/03/90	STORE	LEE	SERVICEABLE	M\$160.80	平成元年年度供与器材 (現地調達)
167	MOLD & CORE TEST HANDBOOK	1					M\$321.60	
168	METALS HANDBOOK VOL. 15 - CASTING.	1					M\$482.40	
169	INFORMATION SOURCES ON THE FOUNDRY INDUSTRY.	1					M\$12.86	

Equipment List / Foundry Technology Unit

R/D NO	NAME OF EQUIPMENT	QUANTITY	ARRIVAL	PLACE	IN CHARGE	CONDITION	PRICE	BUDGET
14	<u>STATIONERY</u>							
1401								
1	CUTTER (BIG)	1 UNIT	28/11/89 232-	COORDINATOR ROOM	KANAMORI	SERVICEABLE	¥12,800.-	深井専門家庭行機材 (本部購送)
2	CUTTER (SMALL)	1 UNIT	98041392	CHIEF ADVISOR ROOM	HARA	SERVICEABLE	¥9,600.-	深井専門家庭行機材 (本部購送)



10-3 資機材購入業者名簿



MOULDING MATERIAL REQUIREMENT

NO.	MATERIAL	SUPPLIER	PRODUCT NAME	DELIVERY PERIOD	COST	REMARKS
1	SILICA SAND	Admet Sdn. Bhd. 16, Lorong Brunei Dua Off Jalan Pudu 55100 Kuala Lumpur	Rawang Origin	1 week	\$150.00/ton	
2	TIN MINE SAND	Syarikat Limmet 83A, Jalan SS 21/37 Damansara Utama, 47400 Petaling Jaya Selangor Tel : 7191228, 7174071	- do -	- do -	\$33.00/ton	
3	FURAN RESIN/ FURAN CATALYST	Lim Kow & Kong Minerals Sdn. Bhd. 75-1B, Main Street, Kepong 5200 Kuala Lumpur Tel: 6342773, 6368170 Fax: 603-6368170	- do -	- do -	\$14.80/kg \$15.80/kg	

4	RESIN COATED SAND	Materials and Chemical Services (M) Sdn. Bhd. 130, Jalan Jasa Lima Taman Jasa, 68100 Batu Caves, Selangor P.O.Box 6233, Pudu Post Office, K.L. Tel : 6897030, 6897031 Fax : 6892068	-	1-2 weeks	\$800/MT
5	BENTONITE	Pakatan Teknik Sdn. Bhd. 78A, Jalan Burhanuddin Helmi Taman Tun Dr. Ismail 60000 Kuala Lumpur Tel: 7188367 Fax: 03-7194797	Wyo-Ben Big Horn	ex stock	\$720/mt
6	COATING AGENT (MOULD)	Syarikat Limmet 83A, Jalan SS 21/37 Damansara Utama, 47400 Petaling Jaya Selangor Tel : 7191228, 7174071	(i) Foseco Terracote 60  (ii) Ashland 40kg/pail  (iii) Foseco Ceramol	- do -  1-2 weeks	\$3.20/kg  \$5.00/kg
	COATING AGENT	- do -			-

7	PARTING AGENT CO2 (MOULD)	Materials and Chemical Services (M) Sdn. Bhd. 130, Jalan Jasa Lima Taman Jasa, 68100 Batu Caves, Selangor P.O.Box 6233, Pudu Post Office, K.L. Tel : 6897030, 6897031 Fax : 6892068	Foseco Sepratele 50	ex-stock	\$8.20/kg
8	PARTING AGENT FOR GREEN SAND	Pakatan Teknik Sdn. Bhd. 78A, Jalan Burhanuddin Helmi Taman Tun Dr. Ismail 60000 Kuala Lumpur Tel: 7188367 Fax: 03-7194797	-	1-2 weeks	\$4.80/kg
9	COATING AGENT (CHILLER)	Syarikat Limmet 83A, Jalan SS 21/37 Damansara Utama, 47400 Petaling Jaya Selangor Tel : 7191228, 7174071	Isomold 220	1-2 weeks	\$7.80/kg
10	FILTER	Kinetik Edar Sdn. Bhd. 97, Wisma Sari Jalan Bangsar 59200 Kuala Lumpur Tel: 2747799, 2748609 Fax: 2742789	Foseco	1-2 weeks	\$6.00/pc



11	DEXTRIN	Admet Sdn. Bhd. 16, Lorong Brunei Dua Off Jalan Pudu 55100 Kuala Lumpur Tel : 2411068, 2424036	-	1-2 weeks	\$8.40/kg
12	METHANOL	General Scientific Co. Sdn. Bhd. 7, Jalan 222, Section 51/A 46100 Petaling Jaya Selangor Darul Ehsan Tel: 7575272, 7565122, 7577714 Fax: 7571768	-	1-2 weeks	\$3.80/lit
13	GLUE	Labchem Sdn. Bhd. 22, Jalan SS 20/10 Damansara Kim 47400 Petaling Jaya	Core-fix	1-2 weeks	\$9.60/tube
14	KEROSENE	Kaifah Sdn. Bhd. 4, Lintang Tamarind Southern Park Klang, 41200 Selangor Darul Ehsan Tel: 3319390	-	1-2 weeks	\$0.64/lit
		Buan Hoa Heong (Mfg) Sdn. Bhd. Lot 7270, 1 1/2 Miles Sungei Bertek Off Telok Gadong Road 41100 Klang Selangor Darul Ehsan			

15	CO2 GAS	<p>Malaysian Oxygen Sdn. Bhd. (MOX)  No. 13, Jalan 222  Section 51/A, 46100  Petaling Jaya  Selangor Darul Ehsan  Tel: 7554233  Fax: 03-7566389</p>	-	1-3 days	\$41.25/cyl	
16	FERROUS OXIDE (IRON OXIDE)	<p>Kinetik Edar Sdn. Bhd.  97, Wisma Sari  Jalan Bangsar  59200 Kuala Lumpur  Tel: 2747799, 2748609  Fax: 2742789</p>	-	-	-	No quote
17	WOODEN FLOUR (HABUK KAYU)	-	-	-	-	-
18	TALC POWDER (CORN FLOUR)	<p>Admet Sdn. Bhd.  16, Lorong Brunei Dua  Off Jalan Pudu  55100 Kuala Lumpur  Tel : 2411068, 2424036</p> <p>Kinetik Edar Sdn. Bhd.  97, Wisma Sari  Jalan Bangsar  59200 Kuala Lumpur  Tel: 2747799, 2748609  Fax: 2742789</p>	-	-	-	

19	SOYA OIL	-	-	-	-	-
20	WATER GLASS (SODIUM SILICATE GRADE C140)	Pakatan Teknik Sdn. Bhd. 78A, Jalan Burhanuddin Helmi Taman Tun Dr. Ismail 60000 Kuala Lumpur Tel: 7188367 Fax: 03-7194797	-	-	\$250.00/lit	
21	CARBON POWDER (COAL DUST)	Syarikat Limmet 83A, Jalan SS 21/37 Damansara Utama, 47400 Petaling Jaya Selangor Tel : 7191228, 7174071	-	-	1.80/kg	
		Materials and Chemical Services (M) Sdn. Bhd. 130, Jalan Jasa Lima Taman Jasa, 68100 Batu Caves, Selangor P.O.Box 6233, Pudu Post Office, K.L. Tel : 6897030, 6897031 Fax : 6892068	-	-		

RAW MATERIALS FOR MELTING

ITEMS	UNIT	UNIT PRICE	SUPPLIER	REMARKS
Pig iron (China)	Ton	\$ 820.00	Foundry Tech Enterprise S.B.	
Steel Scrap	Ton	\$ 640.00	"	
Iron Scrap	Ton	\$ 760.00	"	
Fe-Si (75)	Kg	\$ 4.50	"	
Fe-Si-Mg (5.8)	Kg	\$ 12.00	"	
Copper (pure)	Kg	\$ 8.50	"	
Deslagger	Kg	\$ 2.50	"	
Carbon Powder	Kg	\$ 2.50	"	



10-4 プロジェクトリーダー会議関連資料

10-4-1 Mr. Helme Hashim (感謝状を含む)

10-4-2 原 尚道チーフアドバイザー



10-4-1 Mr. Helme Hashim (感謝状を含む)

Surat kami: SIRIM 415/2/1/3-JICA.

Surat tuan:

Bila menjawab, sila beri rujukan Institut Ini.



INSTITUT PIWAIAN DAN  
PENYELIDIKAN PERINDUSTRIAN  
MALAYSIA

Standards & Industrial Research Institute of Malaysia

Perslaran Dato' Menteri, Seksyen 2,  
Peti Surat 35, 40700 Shah Alam,  
Selangor Darul Ehsan,  
MALAYSIA

1 March, 1990

Mr. Muneshige YAMAZAKI  
Managing Director,  
Mining and Industrial Development  
Cooperation Department,  
Japan International Cooperation Agency (JICA)  
Shinjuku-ku, Tokyo  
163 JAPAN.

Dear Mr. Yamazaki,

First of all I would like to extend my sincere thanks for your letter dated January 31, 1990 and my apology for the late reply. We are now fully occupied with the installation work of the equipment provided by JICA for the FTU project. I am glad to inform you that the work is proceeding well under an excellent supervision by the experts led by Mr. Ohno. We are actually ahead of schedule except for the installation of the induction furnace power pack as you may be aware of the damage occurred during transportation.

With regard to the Project Leaders Conference held in Singapore lately, please find enclosed herewith a copy of my report of attendance to the conference.

I am extremely grateful to your goodself and JICA for the kind invitation to the conference. I hereby congratulate you and those involved in organising such a meaningful function. A special praise is due to Mr. M. Yamashita for his excellent ability to organise the conference and all his hard work for the conference. Although busy he may be, yet he could allocate his time for me to discuss over many issues related to our project. My stay in Singapore has further strengthen my friendship with him. The same goes to Mr. T.Aoki who's admirable character has made my stay in Singapore for the Conference a memorable one.

Once again I thank you very much and hope to see you soon. Please send my regard to all my friends in JICA.

Yours Sincerely.

.....  
(HELME HASHIM)

c.c

- Resident Representative,  
JICA Malaysia Office,  
Kuala Lumpur.



REPORT OF ATTENDENCE  
PROJECT LEADERS CONFERENCE  
IN  
SINGAPORE

(24 - 26 JANUARY, 1990)

Prepared by :

HELME HASHIM

HEAD OF FOUNDRY TECHNOLOGY UNIT

SIRIM

CONTENTS :

- 1 INTRODUCTION
- 2 PLANARY DISCUSSION
- 3 SUGGESTIONS
- 4 ROLE OF CHIEF ADVISOR
- 5 CONCLUSION
- 6 ACKNOWLEDGEMENT

REPORT OF ATTENDANCE  
PROJECT LEADERS CONFERENCE

IN

SINGAPORE

(Date of Attendance - 24 to 26 January 1990)

1 INTRODUCTION

Project Leaders Conference for 1989 was held in Singapore from 21 to 26 January 1990. Among the participant, apart from the 16 JICA Project Leaders and other JICA officials, 3 Counterpart Project Leaders was invited to participate in the Planary session held on the 25 January 1990. The Counterpart Project Leaders were namely; Head of National Productivity Board (NPB) of Singapore, Director of Metalworking and Machinery Industry Development Institute (MIDI) of Thailand, and Head of Foundry Technology Unit (FTU), SIRIM, of Malaysia.

This document contains the report of the Malaysia Counterpart of his attendance at the Project Leader Conference (Planary Session). It should be noted that the content of the report is not exactly what has been said during the session but what is describe here is the intended message to be addressed to the conference. However the title of each point remained unchanged.

It should be strongly emphasised here that the content of the report is written based on observations made over the implementation of a number of SIRIM/JICA projects so far. The content does not necessarily reflect the situation of current FTU project under implementation. Under the able leadership of Dr. N. Hara, the problems highlighted here are well understood by the FTU Chief Advisor, and within his capacity many of these problems were anticipated and measures were taken to alleviate the problems.

## 2. PLANARY DISCUSSION

The Planary Discussion was held at NPB at 8.30 am till 5 pm. During this session the Counterpart Project Leaders were invited to present their project and to raise issues for discussion. However, as this was the first time the Malaysian Counterpart was invited to attend such conference, little was known to him as to how the proceeding would be conducted. Having understood that his role merely as an observer, the Malaysian counterpart presented his case unprepared. Based on his experienced of two earlier SIRIM/JICA projects, the following points were raised for discussion ;

### 2.1 Dispatched of Experts

In most of the JICA Technical Cooperation projects implemented in SIRIM numerous number of experts of related

fields were dispatched. It was without any doubt that the experts have contributed to the success of the implementation of these projects. However, it was observed that the crucial moment of any developmental projects were during their early preparatory stage, i.e during the period of building construction and equipment acquiring and installation. Apparently most of the experts dispatched during this period were 'operational experts' (experts of long term experience in operating of equipment in his related field of technology).

These operational experts, due respect to them, are knowledgeable in their related technology, but rather incapable of supervising plant construction and machine installation. These has led to a significant difficulty in assisting the local counterparts to construct the planned building and installation of equipment.

What is needed of an expert during the period of setting up of a project is one that is able to supervise the construction and plant installation (we would term this as Plant Construction expert). Once the plant and equipment are fully set up and operational, then only the operational experts can play their expected and expert role.

## 2.2 Duration of projects

In general duration of projects are five year terms. The phases of implementation of the project can be divided into two ;

1. construction of building and equipment installation.
2. Operational and learning period.

In most cases, the first phase may take as long as three year while the remaining term of the cooperation is left for second phase. although the first phase is important for local counterpart to participate, but the knowledge acquired during the second phase is of the utmost importance as it is the factor that make a project remain operational for a long time.

Here is the delemma on the local counterparts. The experts that are available during the early stage of project development are operational experts while the priority job to be done is construction and installation of equipment. On one hand, the counterparts wish to learn the operational (or the theoretical) aspects of the technology involve from the expert but his duty at this stage demand for his time to deals with contractors, supplier etc. Thus time management of counterparts can be a major problem.

The second phase of the project is the actual period of technology tranfer taking place, but as stated earlier, in most instances this is the shortest period of the two.

### 2.3 Ability of local contactors

The construction of building and installation of equipment during project implementation largely depends on the ability of local contractors. In most instances choice of local contactors are limited which are in general not as able compared to those may be in Japan, in particular, where the job to be undertaken are new to them. There are times certain specialised equipment needed and materials required not readily available in this country which may add to further delay in their work.

On this account, the local counterparts (being young and impatient) were sometime frustrated by the situation for not being able to meet the requirement by the Japanese side. This sometime led to morale degradation and lost of interest to continue to work hard for the success of the project.

In this respect an understanding of the experts implementing the project is needed, and wherever possible those specialised equipment and materials are made known well ahead before the tender are awarded. Again here the construction and installation experts should be on site to ensure smooth implementation of projects.

### 2.3 The administrative system

In some cases seeking approval on certain issues takes time due to the administrative system of the country. The JICA officials handling projects understood well of the situation and procedures needed. But in some cases, the experts dispatched, which mostly are hand picked from the private sector, may at time overlook this factor and exerting pressure on counterpart to get things done on time, the private sector way. This sometimes frustrate the local counterparts having to do thing beyond his/her administrative authority.

This is not an easy problem to solve but mutual understanding of both parties is needed.

### 2.4 Generation gap

In most cases, the counterparts of projects are young and inexperience personnel. The counterparts are expected to learn and establish a project of certain technology which is new to them. Under this circumstance, they are further subjected to work closely with experts which are in general much elderly. It is without doubt that the old experts are valuable because of their long experience, but the generation gap existed sometime can be a hindrance to the technology transfer process expected. This problem is sometime further elevated by the language and cultural differences of both parties.



## 2.5 Training of counterparts

In general, training of local counterpart cannot be done for a very long period of time. This is mainly due to the fact that the counterparts are needed on project site to assist in the implementation of the project. Further, as well understood most skill to be developed cannot be acquired during the training period as technology learned are mostly achieved by practise and longer time spent on the workshop floor. In this respect, the training to be provided in Japan should be emphasised on exposure to the related technology with basic skill introduction course. Most important aspect of this training is discipline and introduction to the technology involved.

## 2.6 Technology transfer method

This issue has been a subject of debate for a long time and there is no simple method toward achieving a perfect technology transfer mechanism. However, in our own perspective at FTU technology transfer method can be approach with an analogy as 'technology transfer to make cakes'.

In this analogy, in order to transfer technology to make cakes, the Japanese side will provide the necessary equipment needed to make cakes, such as blender, mixer ect. Experts are than dispatch to train the local counterparts on how to operate those machines. The counterparts will then

learn how to blend and mix all the necessary materials to make cakes. However, more often the recipe of cakes are not make known to the counterparts. As a result, the local counterpart are able to operate most of the machines but they are then unable to organise themselves to produce the cakes primarily the recipe is not available. Therefore, in this respect technology has not been transferred effectively as the eventual output of cake are not produce instead the project produced counterparts only able to operate the machines provided.

In anticipation to this possible result happening in FTU, both parties the Japanese and the Malaysian sides has agreed to operate FTU on a concept of 'technology transfer through product development'. With the wisdom of our Chief Advisor, the plan for this operation concept is now organised.

### 3. SUGGESTIONS

Based on the above discussion the following are suggestions in our attempts to reduce the problems that may arise during any Project Type Technical Cooperations ;

#### 3.1 Project planning and implementation stage

In relation to points 2.1, 2.2, 2.3, during building construction and installation stage of a project, a plant design and installation experts should first be dispatched as a long term experts. This will help alleviate the

potential problems may arise as communication for any changes to be made during constructions can be done clearly and efficiently.

It is worth to consider for future projects that during the implementation phase two separate teams are assigned to the project. One is fully responsible for the construction of building and installation of equipment while the other is to attend training and programme related to the operation of the projects. This may help in reducing JICA's problem in locating experts for the initial implementation of projects.

### 3.2 The Administrative System

On the issues of administrative matters, we will improve as we move and learn along. Any discrepancy and problems can be ironed out through negotiation and mutual understanding. On this account, as for current FTU project our Chief Advisor with his admirable ability to sense the potential administrative problems that may arise from time to time and his understanding and patient has alleviated a lot of our problems.

### 3.3 Social functions between experts and counterparts

As expected, language barrier, cultural differences and age gap are factors that can affect the communication difficultly

between experts and counterparts. Most of the counterparts are young, inexperienced and less knowledgeable while the experts are in general elderly, experienced and knowledgeable. This factor led to a certain amount of inferiority complex among counterparts in addition to not knowing what to ask from the experts. Being experienced and knowledgeable alone is not enough to be a good teacher, but to bridge with the student is equally important so as to communicate and teach. On this understanding it is apparent that both parties have to take necessary measures to understand one another.

It is felt that social functions among experts and counterparts have to be frequently organised so that a strong team spirit can be built. Similarly, on a personal basis wherever possible an expert and his counterpart should be close even among their families. This is one way to bridge the generation gap that existed.

It is suggested herewith that some form of fund be allocated for social functions. Special formulated social programmes should be devised with the objective of creating team spirit among experts and counterparts.

### 3.4 Training and Technology Transfer

As previously mentioned, there is no simple mechanism to achieve a perfect technology transfer. However, one way of

achieving an effective transfer of technology is to devise a performance measurement of the result of the work. Here a clear objective as to what level of technology of a particular field is to be transferred during the project duration must be defined, and the level can be measured by the result of the output such as the level of products produced.

In determining the result of the technology transfer, the objective made should not be constraint by the ability of local counterpart/industry, instead consideration of the current need of the technology (or products) should be the target. With these target (or objective) a programme is then formulated, the equipment are provided and the counterparts personnel are trained accordingly.

#### 4 ROLE OF CHIEF ADVISOR

There are two impressive opinions given by two Chief Advisors in their papers at the conference as to their role as leaders of Projects. The opinions are ;

- *The role of Chief Advisor is like a captain in a ship where he has to make plans and decision to ensure the ship arrives at its destination.*
- *The role of Chief advisor is like a lubricant.*

Both opinions carries deep meanings but the role of Chief Advisor in the first statement should be more of an Admiral where he commands from the land with visions while the

Counterpart project leader is more likely the Captain of the Ship. The Captain will carry out his duty with the leadership and vision of the Admiral. From time to time the opinion of the Captain is sought to ensure the situation of the sea, the ship and the crew to ensure right decision is made in any problems that arise as well as any future plan to be carried out.

On both account, it is proud to state here that our Chief Advisor at FTU has carried out his duty as the Admiral described above and with his patience and understanding the implementation of our project has make a significant progress.

## 5 CONCLUSION

The report has spelled out a considerable detail of what the Malaysian Project Leader wished to express himself at the Project Leader Conference in Singapore. The content was not exactly transpired during his speech at the planary session due to time limitation as well as having attended the session unprepared.

## 6 ACKNOWLEDGEMENT

I am truly impressed at the way the Conference was conducted in particular the planary session. A frank discussion on various issues transpired during the session

I find most useful. This is a first time I have been given a picture that there is such a platform for those who involved in JICA projects to voice out their opinions and problems. On this effort, I must congratulate the JICA officials who has been very cooperative, open minded and understanding in the discussion and in organising such a meaningful annual even.

I am extremely grateful to JICA for the invitation to the conference and especially grateful to all friendly JICA officials at the conference who has made my presence welcomed.

I would like to express my deepest appreciation to JICA for giving me the opportunity to present my opinions of matters related to my experiences with Technical Cooperation Projects. It is hope that a points mentioned are taken in good faith for the sake of better implementation of future projects.

METHODS OF TECHNOLOGY TRANSFER IN THE PROJECT ON FOUNDRY TECHNOLOGY UNIT (FTU)

IN THE STANDARDS AND INDUSTRIAL RESEARCH INSTITUTE OF MALAYSIA (SIRIM)

AND ROLE OF THE PROJECT TEAM LEADERS

Naomichi HARA

1. Methods of technology transfer

In this Project, technology transfer is carried out essentially through practice of product development. In this method, choice of "target products" becomes an important factor to rule the efficiency of technology transfer.

Target products should be not only suitable for practice at FTU but also those expected in industries to improve and develop their qualities.

In order to find out technological needs that Malaysian foundry industry is facing, survey on foundryshops was carried out by FTU in cooperation with Japanese experts from July to September, 1989, in which 24 foundryshops were visited. Results of this survey have been reflected in choice of target products.

The time schedule of practice was formulated considering types of metals and difficulty of casting so as to practice from easy ones to difficult ones.

As for types of metals, grey cast iron is first and then ductile cast iron, malleable cast iron, cast steel and cast alloys follow.

As for products, those with simple- and round-shape, uniform thickness and



small size and without core are practiced at early stages, which are followed by more sophisticated and advanced products.

## 2. Role of the project team leaders

In bilateral cooperative projects, there are, of course, two leaders, viz. leader of Japanese team and that of the counterpart team. Necessarily, role of the leader should be shared between both of them. In this sense, mutual understanding and cooperation between both leaders are highly important.

These are applied to the relationship not only between Japanese team and the counterpart team but also among respective team members. Therefore, to keep mutual understanding and cooperation in both teams follows as an important role of the leaders.

In this Project, foundry technology to be transferred is classified into 7 fields in the Record of Discussions, i.e. 1) Pattern making, 2) Melting, 3) Moulding, 4) Quality control, 5) Test and inspection, 6) Finishing, and 8) Product development. To each field, one research officer and several technicians are attached. However, each field can not be independent of others in practice of product development. During practice, all fields should be coordinated to promote a "Group Work" aiming at manufacture of a common target product. During this period, FTU will function as a kind of mini-foundryshop. One of the roles of leaders is to organize and promote this

## "Group Work"

However, it goes without saying that efforts to upgrade technical capability in respective fields based on their own curriculum, which may be called "Individual Work", should be continued in parallel with "Group Work". Since originality, which is a must in R & D, is often cultivated in "Individual Work", the leaders should encourage it, too.

SIRIM is now trying to change its image from a testing institute to an R & D oriented institute. Therefore, technology usable for R & D in future is requested to be transferred in this Project. The leaders should understand the circumstances of their project and be prepared to meet the needs not only at present but also in future.

In the Record of Discussions of our Project, it is described that the ultimate target of this Project is to develop human resources well equipped with foundry technology and capable for contributing to the technical development of foundry industry in Malaysia. Namely, the ultimate target is not for technology or equipment but for human resources. The leaders should always keep it in mind and try to converge all activities on this ultimate target under the consensus of human resources of both teams.



10-5 開所式関連資料

「マ」側マハティール首相出席の可能性を示唆するレター



INSTITUT PIAWAIAN DAN PENYELIDIKAN PERINDUSTRIAN MALAYSIA  
(Standards and Industrial Research Institute of Malaysia)

10th April, 1990

Dr. N. Hara  
Chief Advisor  
SIRIM/JICA project  
Foundry Technology Unit  
SIRIM,

Dear Sir,

OPENING CEREMONY OF FTU PROJECT

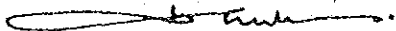
I am glad to inform you that the Controller has made the necessary arrangement with the Prime Minister's Department with regard to the opening ceremony of FTU.

We are therefore instructed to plan all work in preparation for the opening ceremony with the target date of 24 November 1990 (Saturday).

Enclosed herewith is a copy of the E-mail message by the Controller to me for your reference.

Thank you

Yours Sincerely,



.....  
(HELME HASHIM)  
Head of FTU, MIDEK  
SIRIM

E-Mail/3000

SENT BY: PENGAWAL SENT TO: HELME  
COMMENTS: OPENING CEREMONY FOR FOUNDRY

Mail Reception Screen

TITLE:  
DATE: 05/04/90

PLS NOTE THAT THE DATE I HAVE SUGGESTED TO THE PM'S OFFICE FOR THE OFFICIAL  
OPENING OF THE FOUNDRY BY THE PM IS SET FOR:

SATURDAY 24 NOVEMBER 1990

PLS WORK TO THIS DATE UNLESS REQUESTED OTHERWISE BY THE PM'S OFFICE.

PLS INFORM DR HARA ACCORDINGLY FOR HIM TO MAKE PREPARATIONS ON HIS SIDE.

THANKS.

Press the function key of your choice.

1 FIRST 2 CHECK 3 DELETE 4 LIST 5 1 5PREVIOUS6 NEXT 7 PRINT 8 MAIN









JICA