

MAINTENANCE SYSTEM FOR THE FOUNDRY SHOP

- | | |
|--------------------------|-----------------|
| 1. Electric + Electronic | : Suharna |
| 2. Furnace | : Agus Hermawan |
| 3. Mechanical part | : Mamat |

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FOUNDRY EQUIPMENT (TENTATIVE)

NO.	EQUIPMENT	SPECIFICATION	QUALITY	UNIT PRICE USD
1.	Cold chamber Die Casting	Locking 1800 kN, moving die H x V - 670 x 645 Space between tie bar HxV = 435x435, die height 550 mm (max) 150 mm (min), stroke 100 mm Ejector force 128 kN, Injection force 175-178 kN plunger die 40-80 mm, shot capacity 75-3 kg max projected area 129 - 518 mm ² .	1	
2.	Low pressure Die Casting	Distance between colum 1100x800, dia 80mm, min/mix opening/stroke = 200/1400/1200, injection force 12 ton, plate stroke 0/450, lower plate dimension 1750 x 90 x 120 fixed, 1590 x 1000 x 80 move.	1	
3.	Electric Annealing Furnace	LxWxH = 1600 x 2000 x 1600 cm. Temp max 1280C 70 kw	1	
4.	Electric Resistance Furnace	Capacity 300 kg Aluminium alloy	2	
5.	Gravity Die Casting	Die size LxWxH = 350 x 450 x 450 cm, textangle 450C	1	
6.	Ladle Heater	Capacity 2 ladles	1	
7.	Thermocouple for liquid metal	Temperature range up to 1200 C	1	
8.	Thermocouple for liquid metal	Temperature range up to 1700C and 500 pcs probe	3	
10.	Carbon Equivalent Meter	Complete with display, computerized and tectip	2	
11.	Moulding Machine	Jolt squeeze, semi otomatic. pin lift, table: 900 x 800 mm 800 x 600 mm 650 x 500 mm	2 2 2	
12.	Airflow Squeeze Moulding Machine	Table size 750 x 560 mm	1	
13.	Core shooting Machine with gas generator for CO ₂ , Amine and RMF	Volume 10 dm ³ , dimension H x W x Depth = 500 x 600 x 600	1	
14.	Continuous Mixer	Capacity 5 to 6 ton per hour. Sigle arm 4 pump	1	
15.	Molding Box	For Molding Machine: 900 x 800 mm 800 x 600 mm 650 x 500 mm	25 50 25	

Foundry Equipment

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16.	Turbine sand Mixer	Capacity 30 ton/hour	1	
17.	Mix Muller	Capacity 2 ton/hour Capacity 1 ton/hour	1 1	
18.	Monorail Overhead Conveyor	Capacity 1 ton	30	
19.	Pneumatic lifting	Capacity 10 ton	8	
20.	Roll conveyor	Capacity 1 ton, width 60 cm	30	
21.	Hand pneumatic Rammer	Long size Short size	2 2	
22.	Hand pneumatic Chissel	Capacity 1 bar	2	
23.	Mold Descending Vibrator machine	Size 100 x 200 cm	1	
24.	Holding Scale	Capacity 1000 kg	1	
25.	Forklift	Capacity 2,5 ton	1	
26.	Screw Air compressor	FAD = 6 M ³ /min, pressure 10 bar, motor 45 kW Complete with dust collector	1	
27.	Carbon and Sulphur Determinator	Ranger C = 0-6%, S=0-0,5% sampler 0.5 gr, Accuracy = c + 1%, S + 2%, for steel, iron, non ferro, alloy, with coomput	1	
28.	Universal milling Machine for pattern making	Spindle colom 200-750 mm, height 470, diameter 1300 mm, swivelling 360 deg. movement 810 x 315 mm	1	
29.	Lathe machine for pattern making	Centre length 1000/1500 mm, height 500 mm, KW 3,5, 18 spindle DZUS: 55, 160, 410, 870, 70, 210, 430, 1200, 100, 220, 610, 1750, 110,300,640, 150, 310, 860.	1	
30.	Double side disc sanding machine	Diameter 400 mm, table L x W = 500 x 250 mm Accuracy 10 minutes, Protactor degree, included Abrasive paper	2	
31.	Belt sanding machine	Table LxW = 750x350, H=960mm. Tilting degree 30/45 Accuracy 15 minutes Power 4 kW, speed 1400 rpm, blower output 19 m ³ /minutes. water gage 224 mm.	1	
32.	Hobbin sander machine	Table LxW = 500 x 500, H = 1050 mm. Tilting degree 20/30 Accuracy 15 minutes, Sanding height 180mm	1	
33.	Hand saw	Pulley diameter 630, cutting height 510, width 600 mm Table size 750x750 mm, Cutting degree 45/25	2	

Foundry Equipment

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34.	Drill press	Spindle center 500 mm, working height 715 mm and 1215 mm LxW = 490 x 400 mm, 4T slots 12 mm, rotation degree 360 deg.	1	
35.	Coordinate Measuring Machine	3 axis, digital readout, with computer interface and print, measuring toolholder for pins and device	1	
36.	Marking Plate	L x W = 2000 x 1500 mm	2	
37.	Right angle mounting	L x W x H = 150 x 75 x 100 L x W x H = 200 x 100 x 150 L x W x H = 275 x 150 x 200	2 4 2	
38.	Pattern Maker vernier	Measuring range 300 mm 600 mm 1000 mm Srinkage 1%, 1.25%, 1.5% and 2%	6 4 2	
39.	Vernier depth gage	Measuring range 300 mm with srinkage 1, 1.25, 1.5, 2% 150 x 100 200 x 130 250 x 165 300 x 175	2 2 2 2	
40.	Back square Angle	Length of leg/mm 75 x 50 100 x 70 150 x 100 200 x 130 250 x 165 300 x 175	2 2 2 2 2 2	
41.	Atmosphere based furnace	- Temperature max: 1300 oC - Size approx. : 24 x 36 x 15 in - Pump : mechanical pump, hold pump and diffusion pump. - Automatic cycle - Recorder : Temperatur and gas flow recorder - Cold-wall construction for rapid cooldown, complete with heat exchanger. - Include Nitrogen and Argon tank	1	
42.	Hand tools for pattern making	One set, complete	1	
		Total		

Foundry Equipment

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**Annex 12 List of Counterparts Tentatively Allocated
Project on Supporting Industries Development for Casting Technology**

Full Name (Underline Family Name)	Title of present job	Division/ Section	Experience (Years)		Year of Birth	Sex	Academic Qualification obtained	Training/Study Experience in Foreign Countries	Speciality	Description of Current Job	Remarks
			In MIDC (5)	In Foundry Field (6)							
(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)
<u>Endang Dahlan</u>	Director		2	10	1946	M	Electrical Engineer	Japan, Australia, New Zealand, Germany, Austria, Mexico.		Manage & Coordinate MIDC	
<u>Lilis Yuliasetiwani</u>	Head of section	Heat treatment and metal plating section	13	10	1958	F	Metallurgy Engineering	Japan, Belgium	Surface treatment	Surface treatment	
<u>Abdurahim</u>	Head	Division of R & D	22	20	1948	M	Metallurgy Engineering	Japan, Belgium	Foundry & Heat-treatment	R & D on Metallurgy field	
<u>Dadang Supriana</u>	Melting	Foundry	3	3	1964	M	Metallurgy Engineering	Japan	Metallurgy melting	Preparation of metallurgy melting	
<u>George Zainal Hady</u>	Researcher on the field of foundry production technology	Division of R & D	18	7	1953	M	Bachelor of Engineering	Japan, England, Netherland, Germany	Molding & Core making technology	Researcher on the field foundry production technology	
<u>Djuanda</u>	Moulding	Foundry	23	23	1949	M	Senior High School	Belgium	Moulding	Mould and Core making	
<u>Nuryantoro Supar</u>	Moulding	Foundry	17	17	1949	M	Senior Technical High School		Moulding	Mould and Core making	
<u>Boirun Ioni</u>	Moulding	Foundry	16	16	1957	M	Senior Technical High School		Moulding	Mould and core making	
<u>Rudy Suhradi Rahmat</u>	Engineering	Foundry	10	10	1962	M	Engineer and Master Engineering	Japan	Casting design	Foundry Engineering	

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)
10.	Agus Hermawan	Melting	Foundry	13	13	1965	M	College	Japan	Melting and Pattern Making	Preparation of Metallurgy Melting	
11.	A. Syaifulin Talibnapi	Head of Foundry Section	Foundry	16	12	1954	M	Engineer and Master of Engineering	Belgium, Japan, Austria	Materials	Organize and Manage of Foundry Section	
12.	Dedy Supriana	Pattern Making	Foundry	18	18	1960	M	Senior Technical High School	Belgium	Pattern	Pattern design & Pattern making	
13.	Achmad Karnatmadia	Pattern Making	Foundry	25	25	1949	M	Senior Technical High School	Belgium	Pattern	Pattern design	
14.	Rachmat	Pattern Making	Foundry	13	13	1964	M	Senior Technical High School		Pattern	Pattern Making	
15.	Abdul Wahid	Head	Division Process	17	6	1954	M	Ph.D	Japan, USA	Metallurgist	Manager	
16.	Tatang Tarvaman	Engineering	Foundry	19	19	1953	M	Engineer	Belgium	Moulding, Analysis casting defect	Foundry Engineering	
17.	Roslina	Chemical Analyst	Foundry	16	16	1960	F	Senior Analyst High School		Chemical Analyst	Quality control materials	
18.	Sudarman	Sand Testing Lab. Testing	Foundry	25	25	1947	M	Senior High School	Belgium	Sand control	Sand control & Moulding making	
19.	Ruchiyat	Melting	Foundry	13	13	1959	M	Senior Technical High School		Melting	Melting operator	

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COUNTER BUDGET ALLOCATION FOR THE PROJECT

A. PROVISIONAL PLAN OF LOCAL COST

NR.	FISCAL YEAR	x Rp 1,000						TOTAL
		1997/1998	1998/1999	1999/2000	2000/2001	2001/2002	2002/2003	
1	Staff Expenses	18,000	30,000	50,000	50,000	50,000	40,000	238,000
2	Building, facilities and consumables	-	220,000	165,000	-	-	-	385,000
		59,000	55,000	-	-	-	-	114,000
3	Equipment, maintenance and Operation	36,500	50,000	50,000	50,000	50,000	50,000	286,500
		-	16,500	20,000	50,000	110,000	112,000	308,500
4	Utilities	10,000	10,000	20,000	20,000	20,000	20,000	100,000
		-	10,000	20,000	25,000	25,000	20,000	100,000
5	Communication and Others	-	-	-	-	-	-	-
		-	-	-	-	-	-	-
5	Domestic transportation Handling and Installation of equipment	24,500	63,500	30,000	30,000	40,000	30,000	218,000
		-	75,000	-	-	-	-	75,000
		-	-	175,000	-	-	-	175,000
	Total Annual Local Costs	148,000	530,000	530,000	225,000	295,000	272,000	2,000,000

B. SOURCE OF COUNTER BUDGET JICA TECHNICAL ASSISTANCE YEAR 1997/1998 AND 1998/1999

Nr.	FISCAL YEAR	Budget				TOTAL	
		Development		Routine			
		1997/1998	1998/1999	1997/1998	1998/1999	1997/1998	1998/1999
1	Staff Expenses	18,000	30,000			18,000	30,000
2	Building, facilities and consumables	59,000	220,000			59,000	220,000
		-	55,000				55,000
3	Equipment, maintenance and Operation	11,500	16,500	20,000	50,000	31,500	66,500
		5,000	-			5,000	
4	Utilities	-	26,500	5,000	10,000	5,000	36,500
		-	-	5,000	10,000	5,000	10,000
5	Communication and Others	-	-				
		-	-				
5	Domestic transportation Handling and Installation of equipment	17,500	37,000			17,500	37,000
		7,000	75,000			7,000	75,000
	Total	118,000	460,000	30,000	70,000	148,000	530,000

**MIDC' TECHNOLOGICAL SERVICE TO INDUSTRIES
YEAR 1997/1998 AND 1998/1999**

YEAR	1997/1998 COST Rp	1998/1999 000 Rp
Applied R & D	250.000	550.000
Technical Training	350.000	370.000
Product Testing	25.000	50.000
Technical Consultation	240.000	480.000
Calibration & Metrology	150.000	150.000
Design, Prototyping and Product Development.	185.000	55.000
Environment Service	-	50.000
Saldo 1997/1998	-	95.000
TOTAL	1.200.000	1.800.000

(SAMPLE)

Annex 15

RECORD OF DISCUSSIONS BETWEEN JAPANESE
IMPLEMENTATION STUDY TEAM AND
AUTHORITIES CONCERNED OF THE GOVERNMENT OF
THE REPUBLIC OF INDONESIA
ON JAPANESE TECHNICAL COOPERATION
FOR PROJECT ON SUPPORTING INDUSTRIES DEVELOPMENT
FOR CASTING TECHNOLOGY IN THE REPUBLIC OF INDONESIA

The Japanese Implementation Study Team organized by Japan International Cooperation Agency and headed by _____ (hereinafter referred to as "the Team"), visited the Republic of the Indonesia from _____, 1997 to _____ 1997 for the purpose of working out the details of the technical cooperation program concerning Project on Supporting Industries Development for Casting Technology in the Republic of Indonesia.

During its stay in the Republic of Indonesia, the Team exchanged views and had a series of discussions with the Indonesian authorities concerned with respect to desirable measures to be taken by both Governments for the successful implementation of the above-mentioned Project.

As a result of the discussions, the Team and the Indonesian authorities concerned agreed to recommend to their respective Governments the matters referred to in the document attached hereto.

Jakarta, _____, 1997

Leader
Japanese Implementation Study Team
Japan International Cooperation Agency
Japan

Republic of Indonesia

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ATTACHED DOCUMENT

I. COOPERATION BETWEEN BOTH GOVERNMENTS

1. The Government of the Republic of Indonesia will implement Supporting Industries Development for Casting Technology in the Republic of Indonesia (hereinafter referred to as "the Project") in cooperation with the Government of Japan.
2. The Project will be implemented in accordance with the Master Plan which is given in ANNEX I.

II. MEASURES TO BE TAKEN BY THE GOVERNMENT OF JAPAN

In accordance with the laws and regulations in force in Japan, the Government of Japan will take, at its own expense, the following measures through Japan International Cooperation Agency (hereinafter referred to as "JICA") according to the normal procedures under the Colombo Plan Technical Cooperation Scheme.

1. DISPATCH OF JAPANESE EXPERTS

The Government of Japan will provide the services of the Japanese expert as listed in ANNEX II.

2. PROVISION OF MACHINERY AND EQUIPMENT

The Government of Japan will provide such machinery, equipment and other materials (hereinafter referred to as "the Equipment") necessary for the implementation of the Project as listed in ANNEX III. The Equipment will become the property of the Government of the Republic of Indonesia upon being delivered CIF (cost, insurance and freight) to the Indonesian authorities concerned at the ports and/or airports of disembarkation.

3. TRAINING OF THE INDONESIAN PERSONNEL IN JAPAN

The Government of Japan will receive the Indonesian personnel connected with the Project for technical training in Japan.

III. MEASURES TO BE TAKEN BY THE GOVERNMENT OF THE REPUBLIC OF INDONESIA

1. The Government of the Republic of Indonesia will take necessary measures to ensure that the self-reliant operation of the Project will be sustained

during and after the period of Japanese technical cooperation, through full and active involvement in the Project of all related authorities, beneficiary groups and institutions.

2. The Government of the Republic of Indonesia will ensure that the technologies and knowledge acquired by the Indonesian nationals as a result of the Japanese technical cooperation will contribute to the economic and social development of the Republic of Indonesia.
3. The Government of the Republic of Indonesia will grant in the Republic of Indonesia privileges, exemptions and benefits to the Japanese experts referred to in II-1 above and their families, which are no less favorable than those accorded to experts of third countries working in the Republic of Indonesia under the Colombo Plan Technical Cooperation Scheme.
4. The Government of the Republic of Indonesia will ensure that the Equipment referred to in II-2 above will be utilized effectively for the implementation of the Project in consultation with the Japanese experts referred to in ANNEX II.
5. The Government of the the Republic of Indonesia will take necessary measures to ensure that the knowledge and experience acquired by the Indonesian personnel from technical training in Japan will be utilized effectively in the implementation of the Project.
6. In accordance with the laws and regulations in force in the Republic of Indonesia, the Government of the Republic of Indonesia will take necessary measures to provide at its own expense:
 - (1) Service of the Indonesian counterpart personnel and administrative personnel as listed in ANNEX IV;
 - (2) Land, buildings and facilities as listed in ANNEX V;
 - (3) Supply or replacement of machinery, equipment, instruments, vehicles, tools, spare parts and any other materials necessary for the implementation of the Project other than the Equipment provided through JICA under II-2 above;
 - (4) Means of transport and travel allowances for the Japanese experts for official travel within the Republic of Indonesia; and
 - (5) Suitably furnished accommodations for the Japanese experts and their families.

7. In accordance with the laws and regulations in force in the Republic of Indonesia, Government of the Republic of Indonesia will take necessary measures to meet:

- (1) Expenses necessary for transportation within the Republic of Indonesia of the Equipment referred to in II-2 above as well as for the installation, operation and maintenance thereof;
- (2) Customs duties, internal taxes and any other charges imposed in the Republic of Indonesia on the Equipment referred to in II-2 above; and
- (3) Running expenses necessary for the implementation of the Project.

IV. ADMINISTRATION OF THE PROJECT

1. Head of Agency of Industry and Trade for Research and Development (hereinafter referred to as "BBPIP") of Ministry of Industry and Trade (hereinafter referred to as "MOIT"), as the Project Director, will bear overall responsibilities for the administration and implementation of the Project. Director General of Metal, Machinery and Chemical Industry (hereinafter referred to as "MMCI") will act as the Deputy Project Director.
2. The Director of the Institute of Research and Development of Metal and Machinery Industry (hereinafter referred to as "IRDMMI"), as the Project Manager, will be responsible for the managerial and technical matters of the Project.
3. The Japanese Chief Advisor will provide necessary recommendations and advice to the Project Director and the Project Manager on any matters pertaining to the implementation of the Project.
4. The Japanese experts will provide necessary technical guidance and advice to the Indonesian counterpart personnel on technical matters pertaining to the implementation of the Project.
5. For the effective and successful implementation of technical cooperation for the Project, a Joint Coordinating Committee will be established whose functions and composition are described in ANNEX VI.

V. JOINT EVALUATION

Evaluation of the Project will be conducted jointly by the two Governments through JICA and the Indonesian authorities concerned, at the middle and

during the last six months of the cooperation term in order to examine the level of achievement.

VI. CLAIMS AGAINST JAPANESE EXPERTS

The Government of the Republic of Indonesia undertakes to bear claims, if any arises, against the Japanese experts engaged in technical cooperation for the Project resulting from, occurring in the course of, or otherwise connected with the discharge of their official functions in the Republic of Indonesia except for those arising from the willful misconduct or gross negligence of the Japanese experts.

VII. MUTUAL CONSULTATION

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

VIII. MEASURES TO PROMOTE UNDERSTANDING OF AND SUPPORT FOR THE PROJECT

For the purpose of promoting support for the Project among the people of the Republic of Indonesia, the Government of the Republic of Indonesia will take appropriate measures to make the Project widely known to the people of the Republic of Indonesia.

IX. TERM OF COOPERATION

The duration of technical cooperation for the Project under this Attached Document will be five (5) years from 1, 1998.

(Note)

The ANNEXES underneath will be attached.

- ANNEX I MASTER PLAN
- ANNEX II LIST OF JAPANESE EXPERTS
- ANNEX III LIST OF MACHINERY AND EQUIPMENT
- ANNEX IV LIST OF THE INDONESIAN COUNTERPART AND ADMINISTRATIVE PERSONNEL
- ANNEX V LIST OF LAND, BUILDING AND FACILITIES
- ANNEX VI JOINT COORDINATING COMMITTEE
- ANNEX VII ORGANIZATION CHART OF THE PROJECT

LIST OF ATTENDANCE

- I. The Team of JICA
 1. Masayoshi Nakayama - Leader
 2. Toru Homma - Member

- II. Indonesian/IRDMMI (MIDC)
 1. Ir. Endang Dahlan - Director
 2. Ir. Rosidy - Head of Administration Division
 3. Ir. J. Suyono - Head of Product Dev. Division
 4. Ir. Abdurahim - Head of Research Division
 5. Dr. Ir. Abdul Wahid Msc - Head of Process Dev. Division
 6. Ir. A. S. Tayibnapi, M. Eng - Head of Foundry Section
 7. Ir. Lilis Yuliasetiawati - Head of Heattreatment & Metal Plating Sec.
 8. Ir. Tatang Taryaman - Staff of Foundry Section
 - 9 George Z. Hadi, BE - Staff of Research Division Section

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2 事前に送付した質問書

QUESTIONNAIRE FOR IMPLEMENTATION OF THE SUPPLEMENTARY STUDY (PHASE II) ON THE JAPANESE TECHNICAL COOPERATION FOR THE PROJECT ON SUPPORTING INDUSTRIES DEVELOPMENT FOR CASTING TECHNOLOGY IN THE REPUBLIC OF INDONESIA

JICA plans to implement the Supplementary Study (Phase II) (hereinafter referred to as "the Study") for the Project on Supporting Industries Development for Casting Technology (hereinafter referred to as "the Project") from 8 December 1997 to 19 December 1997.

In order to make the activities of the Study Team as effective as possible, JICA needs to get relevant data and information in advance by asking some questions or by asking to make some arrangements mentioned below.

It would be much appreciated if the MIDC authorities fill out the forms (see Chapter I below), prepare the answers (see Chapter II below) and forward them to the JICA Indonesia Office by 8 December 1997. Although the written forms and the answers will be collected at JICA Indonesia Office by the Study Team on 8 December 1997, it would be preferable some of the completed forms and answers to be sent to JICA Indonesia Office and the Headquarters in Tokyo as early as possible before the dispatch of the Team.

It would be also appreciated if the MIDC authorities make some arrangements (see Chapter III below) according to the following descriptions by 8 December 1997.

I. Forms to be filled out and received by JICA by 8 December 1997

Concerning the two items below (1 and 2), please fill out the forms attached herewith and forward them to JICA Indonesia office by 8 December 1997.

Please make some photocopies of blank forms in case of need for additional pages to be filled out.

1. Counterpart

Please fill out the Form 1 attached herewith concerning all the counterpart personnel assigned for the Project.

2. Machinery/Equipment

Please fill out the Form 2 attached herewith concerning all the existing machinery/equipment in MIDC foundry shop and pattern shop.

II. Items to be answered by 8 December 1997

Concerning the three items below (1, 2 and 3), please prepare answers and send them to the JICA Indonesia Office by 8 December 1997.

1. Layout /Floor Plan

Please prepare some drafts/drawings of the foundry shop with measurements including the items mentioned below.

- (1) Underground structure, beams on the ceiling, posts and other significant structure
- (2) Pipes, electric wires and other utilities

2. Current Significant Activities

Please describe the following activities in detail.

- (1) Training Course in 1997
- (2) Technical consultation to small and medium industries
- (3) Manufacturing wooden pattern requested/ordered
- (4) Analyses and tests requested/ordered
- (5) Other significant activities

3. Structure of Organization

Please prepare the answers on the following items.

- (1) Existence of maintenance section or particular maintenance system for the Foundry Shop
- (2) Existence of Testing and Calibration Section mentioned as a counterpart section

III. Items to be prepared by MIDC by 8 December 1997

Please make the arrangements on the items below. It would be much appreciated if MIDC answer in advance how far the arrangements go.

1. Some samples produced in MIDC for presentation to the Team
 - (1) Casting products and prototypes
 - (2) wooden patterns
2. Tentative schedule for individual interviews between all the MIDC counterpart technicians and JICA mission members (Ten(10) minutes for each interviewee and sufficient time for observation for technical skill)
3. Manuals, drawings and other documents for all the existing equipment in MIDC foundry shop and pattern shop
4. Proper arrangements for operations of existing machinery/equipment during the study.

Attachment: Form 1 List of Counterparts Tentatively Allocated
Form 2 List of Equipment Currently Existing in MIDC

Form 1: List of Counterparts Tentatively Allocated
Project on Supporting Industries Development for Casting Technology

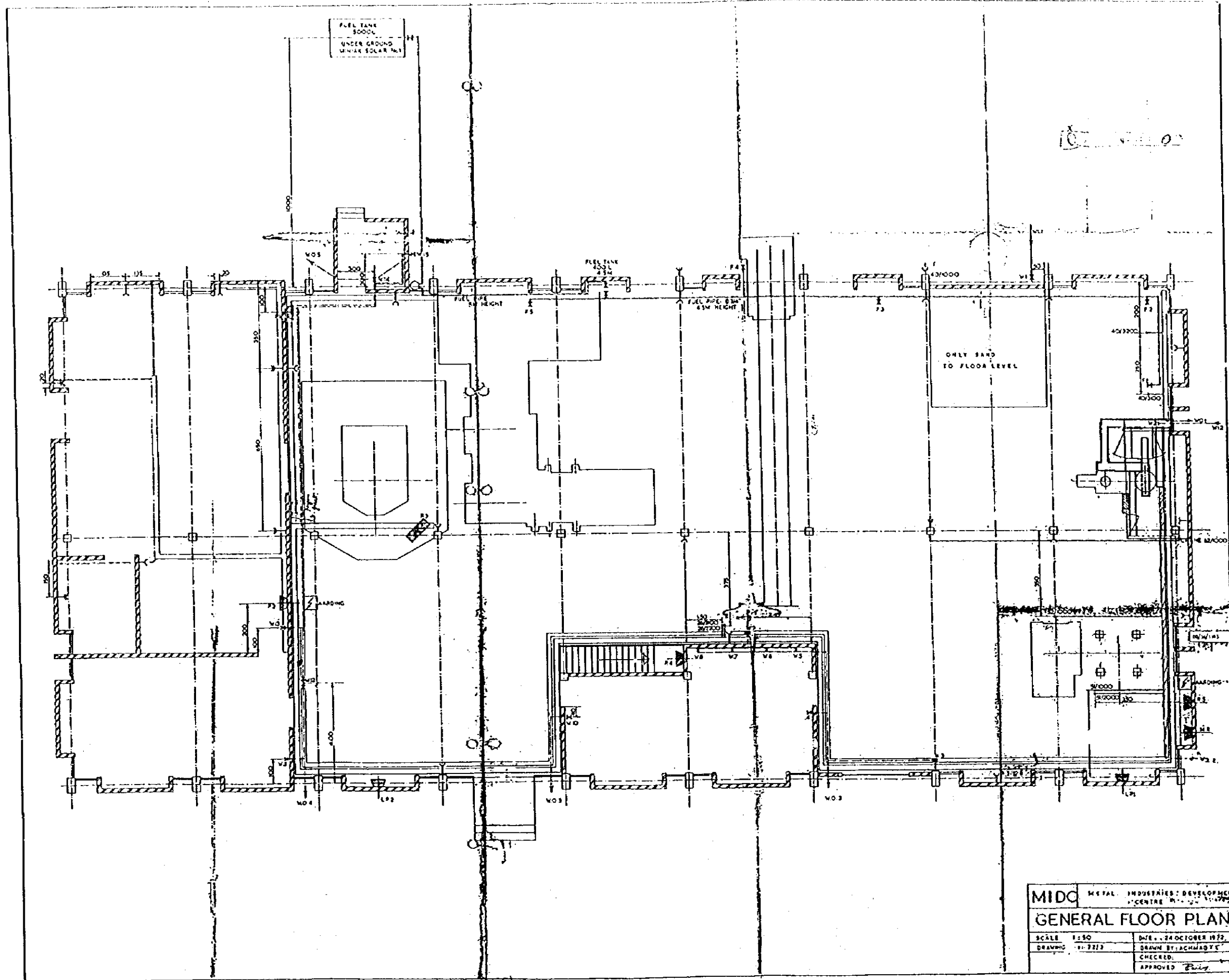
No.	Full Name (underline) Family Name	Title of Present Job	Division/Section	Experiences (years) in M/DC in Foundry Field	Year of Birth	Sex	Academic Qualification Obtained	Training/Study Experience in Foreign Countries	Speciality	Description of Current Job	Remarks

Form 2: List of Equipment Currently Existing in MIDC
Project on Supporting Industries Development for Casting Technology

No.	Name of Equipment/ Machinery	Maker (Country of Origin)	Capacity	Specifications	Volume	Date of Installation	Current Usage and its Frequency	Status of Spare Parts Stored	Availability of Spare Parts in Indonesia	Remarks

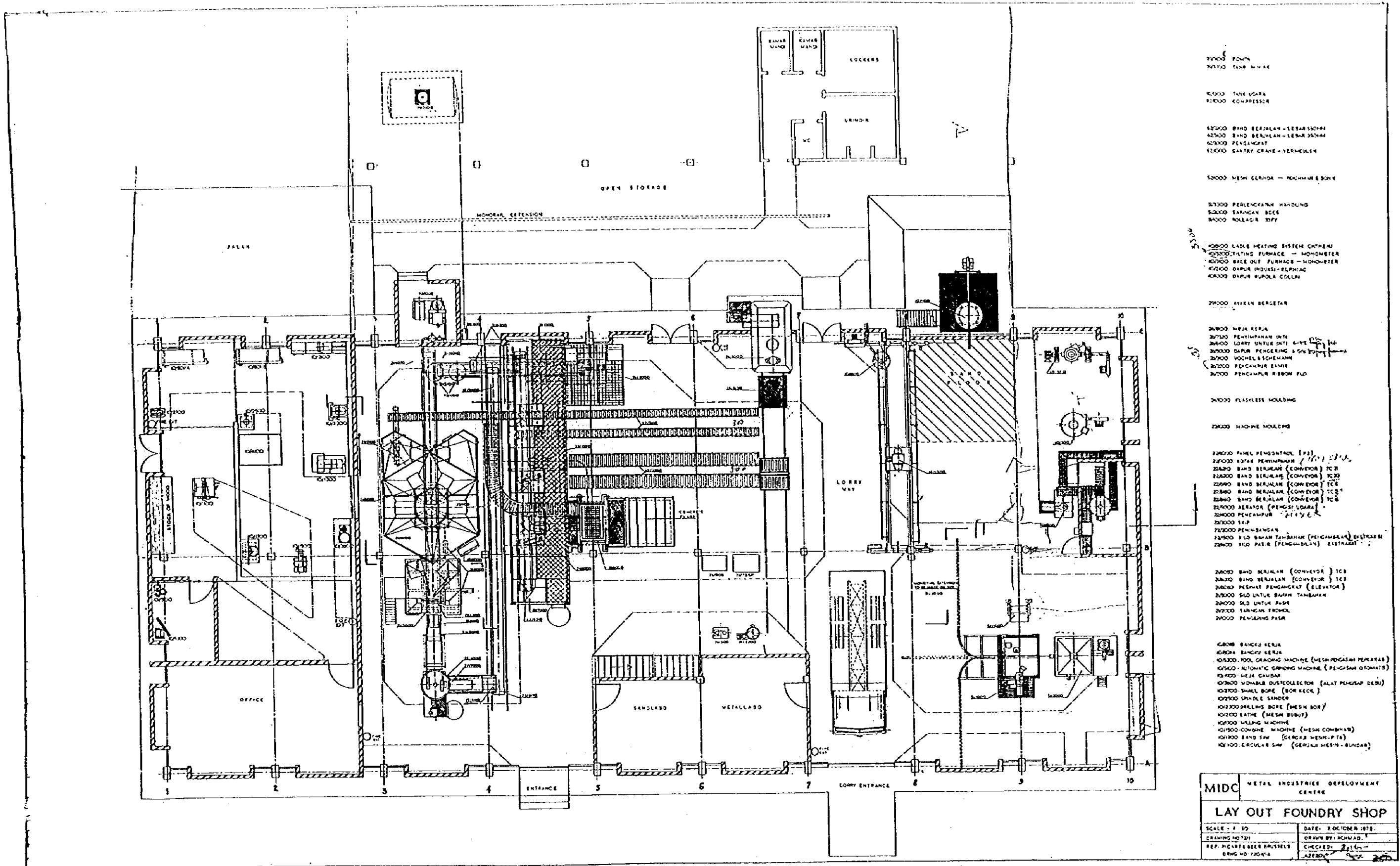
3 MIDC 鑄造棟 (ワークショップ) 関連図面類

(1) 平面図 (General Floor Plan)

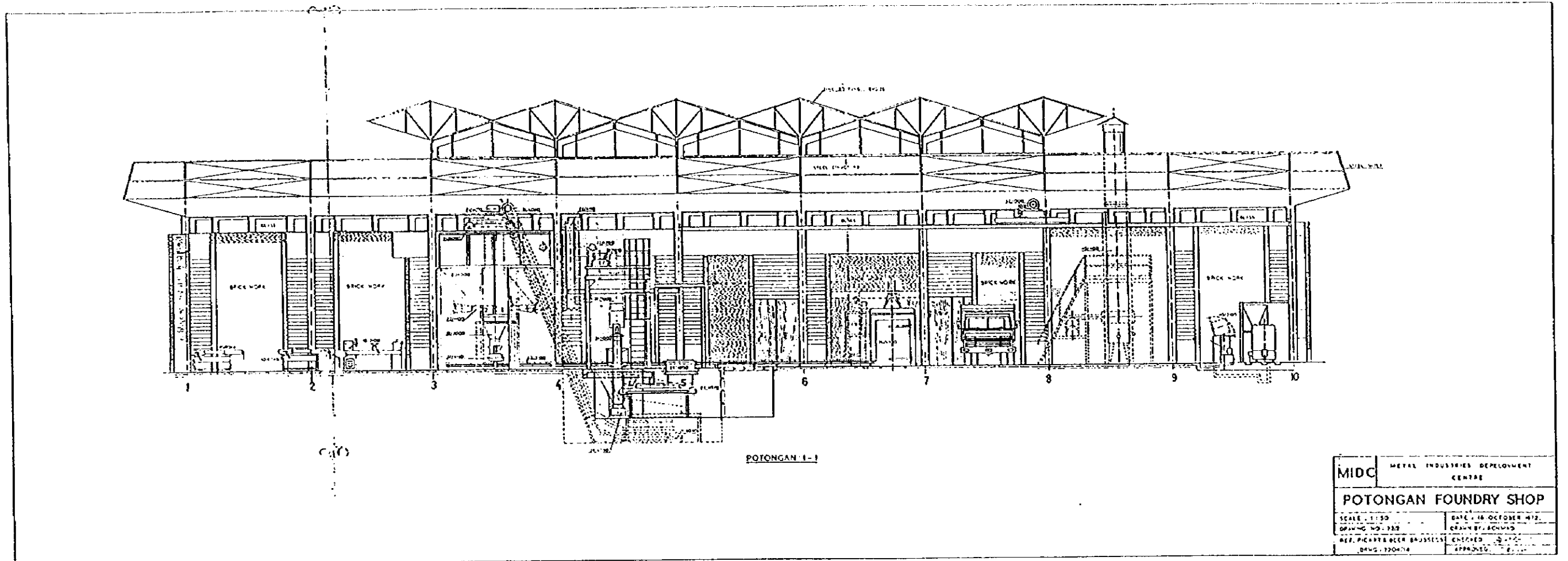


MIDC METAL INDUSTRIES DEVELOPMENT CENTRE	
GENERAL FLOOR PLAN	
SCALE 1:50	DATE 24 OCTOBER 1972
DRAWING NO. 2212	DRAWN BY: SCHMADT
	CHECKED:
	APPROVED: <i>Boley</i>

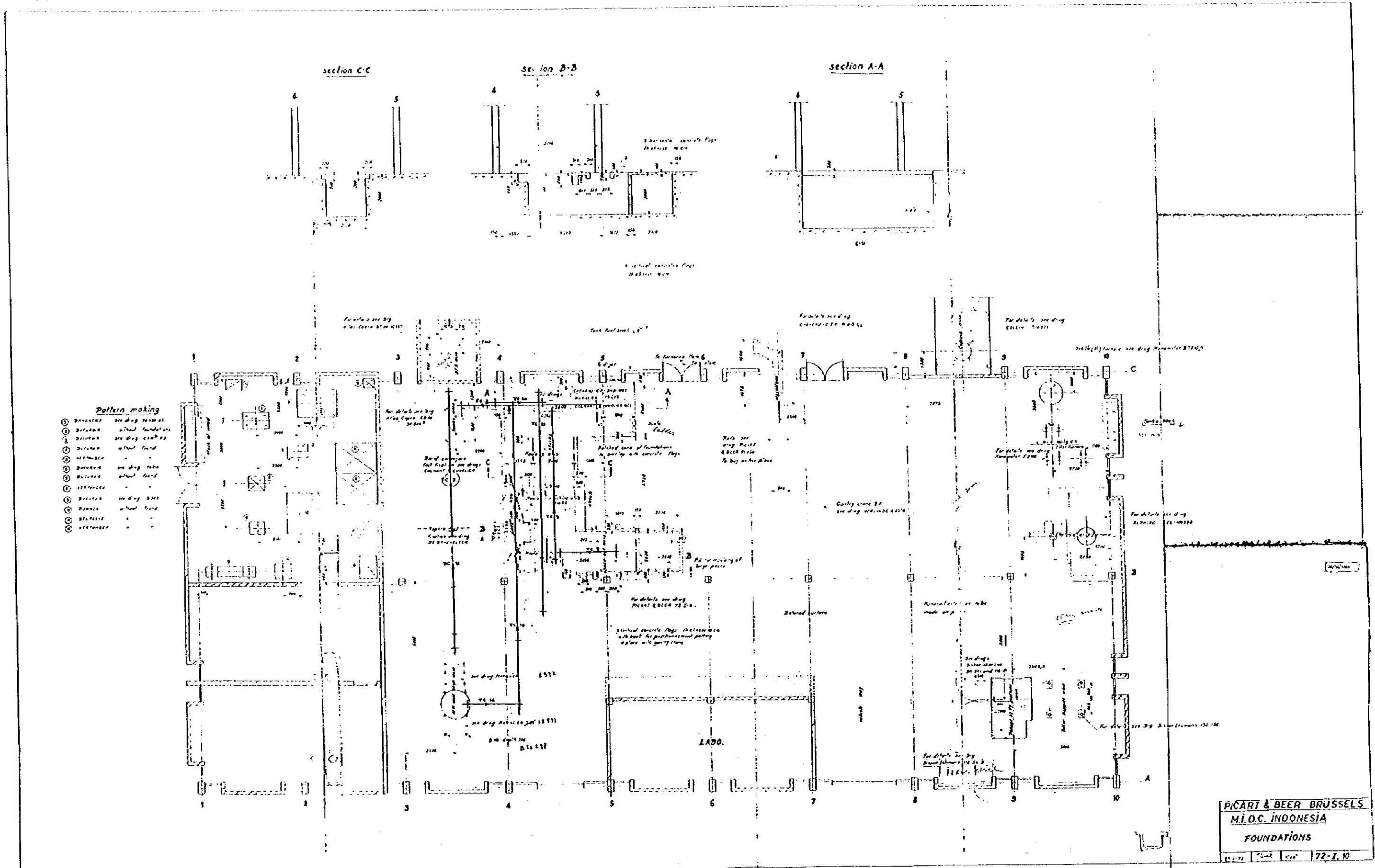
(2) 機材レイアウト図 (Lay Out Foundry Shop)



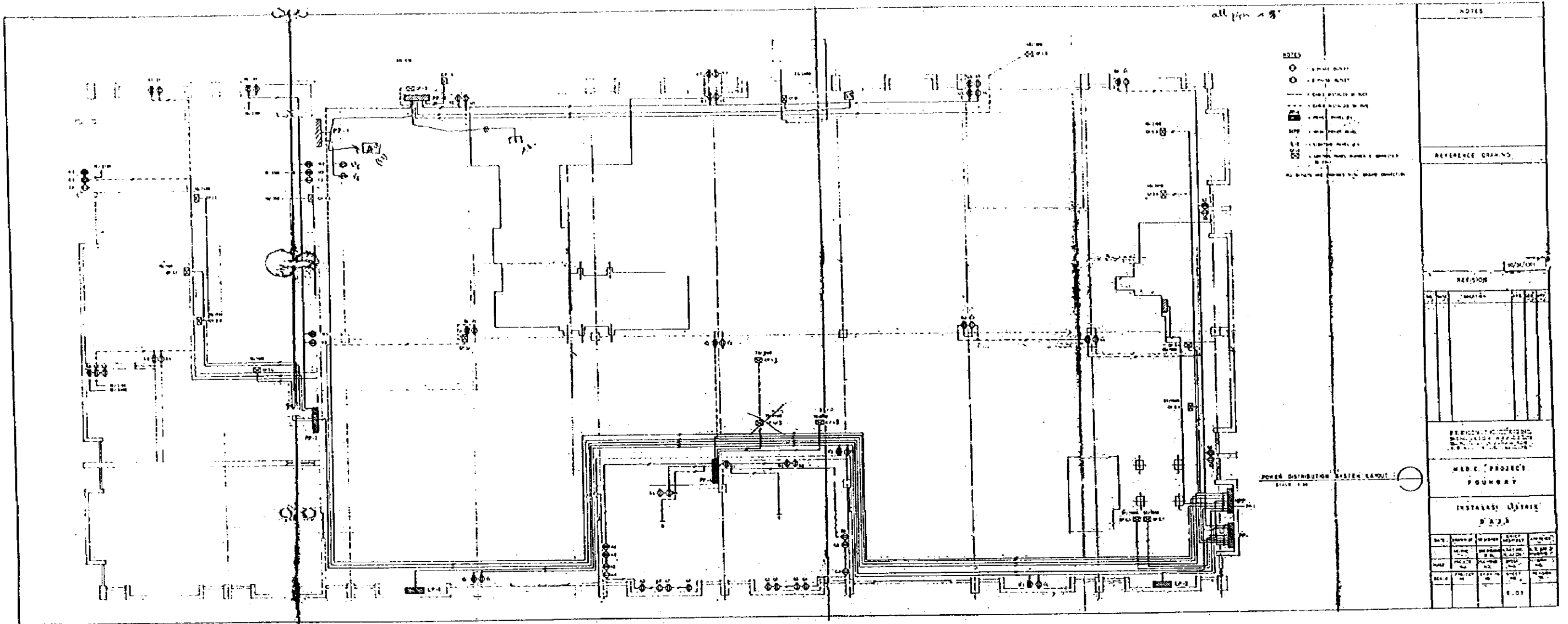
(3) 侧面图

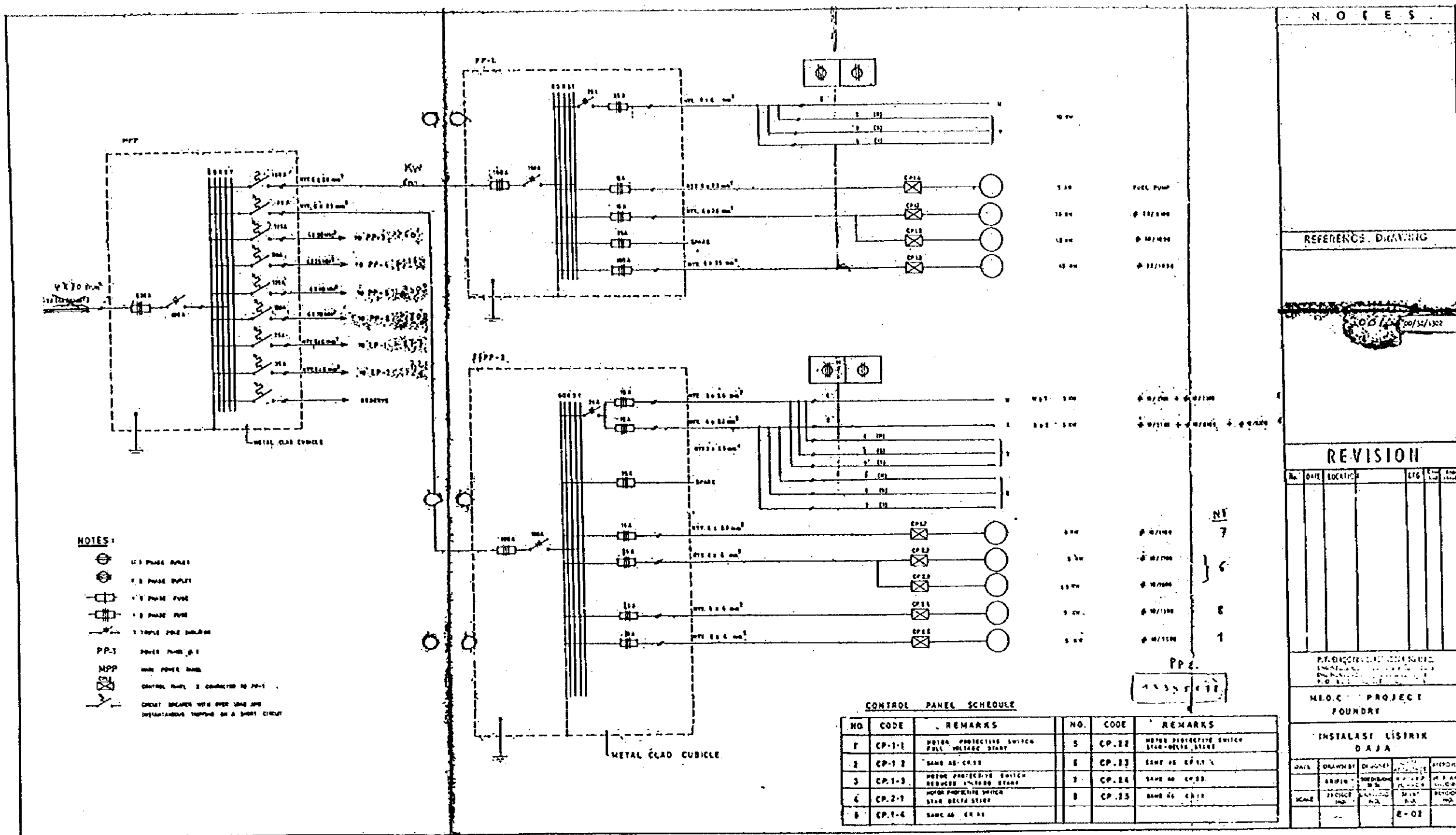


(4) 基礎図 (Foundations)



(5) 電源供給配線図 (Power Distribution System Layout)





NOTES

REFERENCE DRAWING

REVISION

No.	DATE	LOCATION	BY	CHKD.	APP.

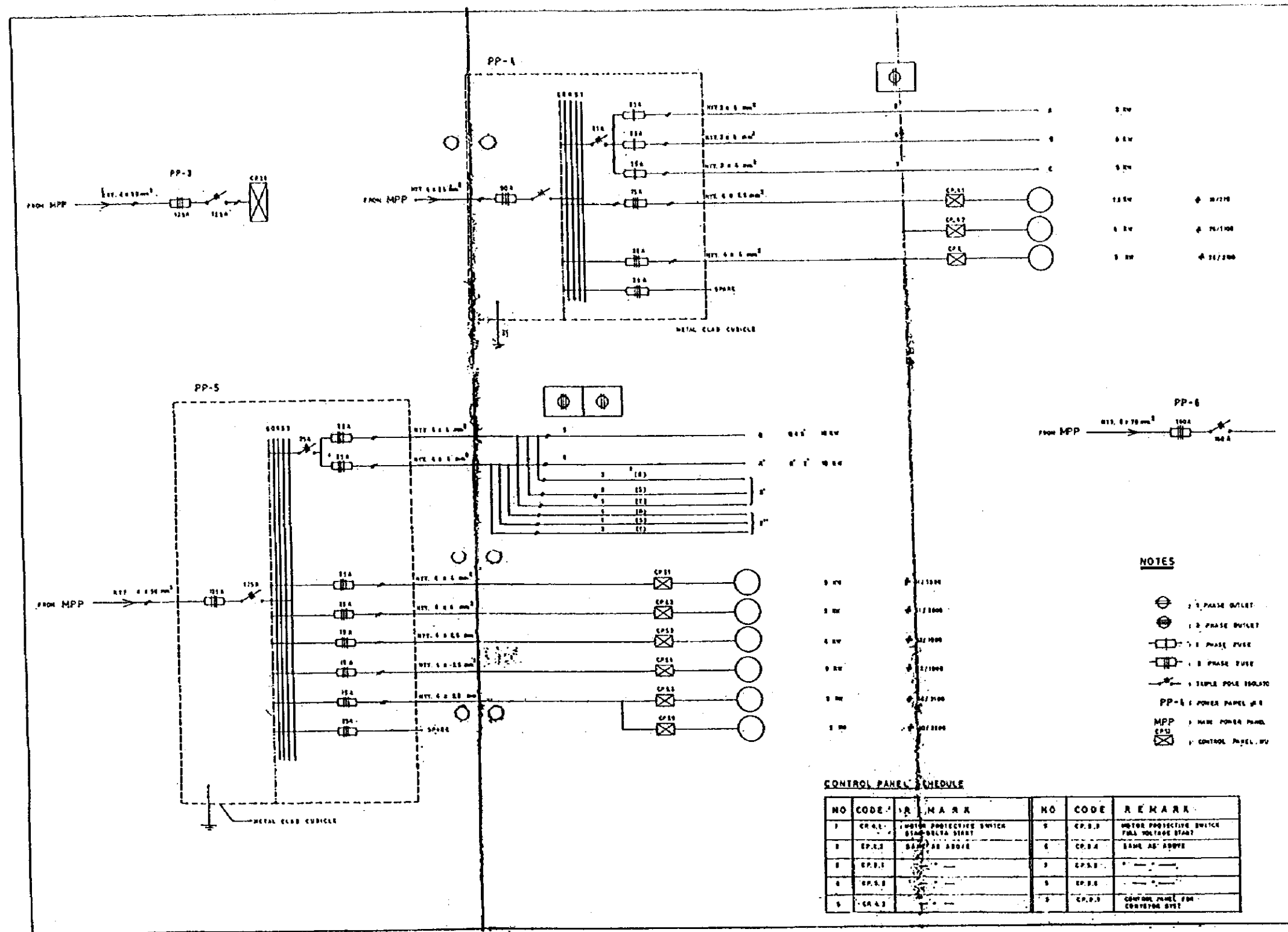
P.F. ENGINEERING CONSULTANTS
 INSTALASI LISTRIK
 PT. BUKIT MURNI
 P.O. BOX 100000
 JAKARTA 10100

M.E.C. PROJECT
 FOUNDRY

INSTALASI LISTRIK
 D A J A

DATE	DRAWN BY	CHECKED BY	APPROVED BY	SCALE	REVISION

E-02



NOTES

REFERENCE DRAWING

00/24/1303

REVISION

No	DATE	REVISION	BY	CHK	APP

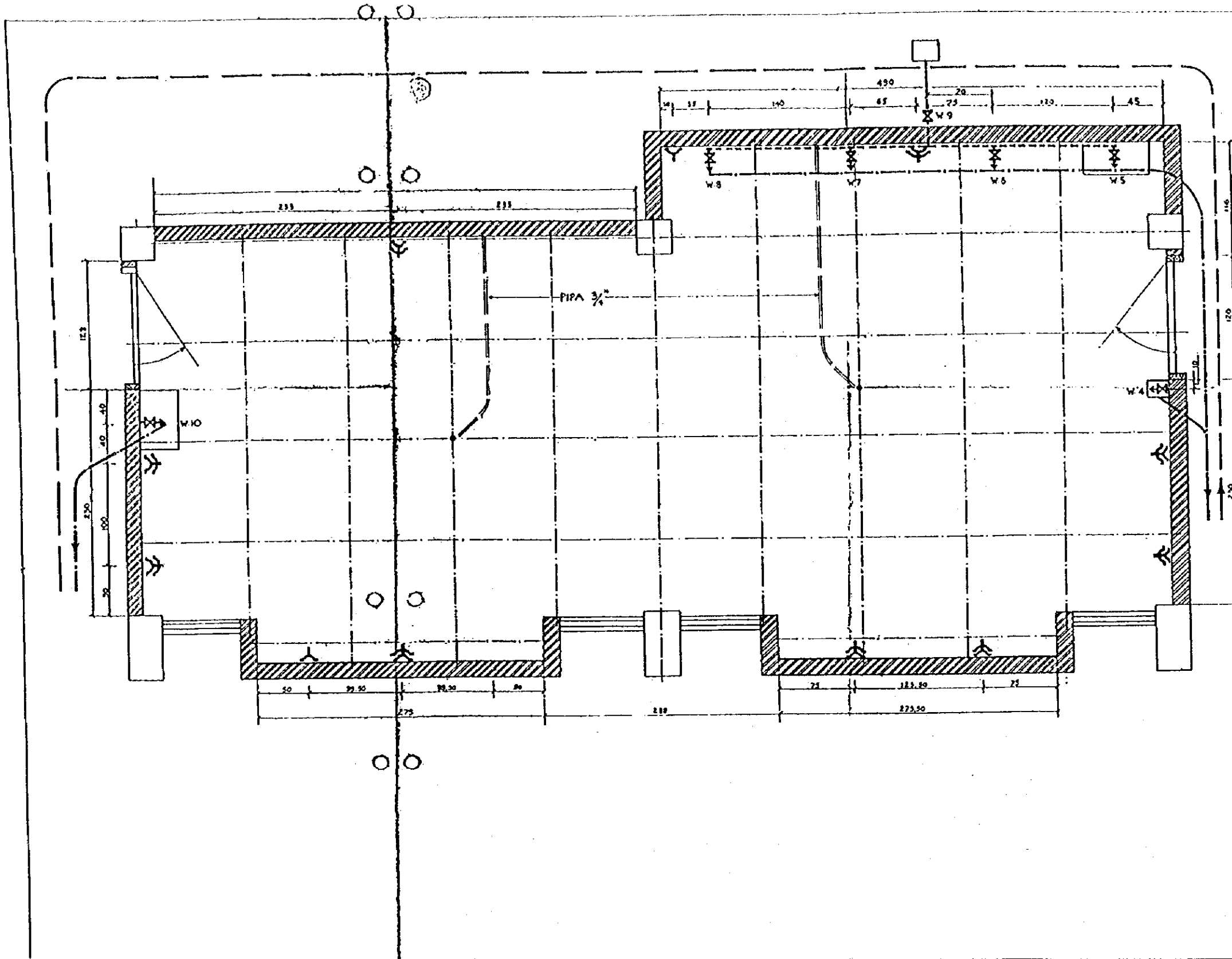
M.I.D.C. PROJECT
FOUNDRY

INSTALASI LISTRIK
D.A.J.A

DATE	DRAWN	DESIGN	CHEK	APPROVED

E-03

(6) 空気配管図 (Compressor Air System)



TJATATAN:

←	Stopkontak tunggal
←←	ber ganda
⊕	Kraan air
----	Saluran air masuk
----	Saluran pembuangan
	Pemasangan kraan air + 100 cm
	Stopkontak + 100 cm
•	Saluran kabel utk stopkontak dimaja.

00/34/1304

FOUNDRY, LABORATORY

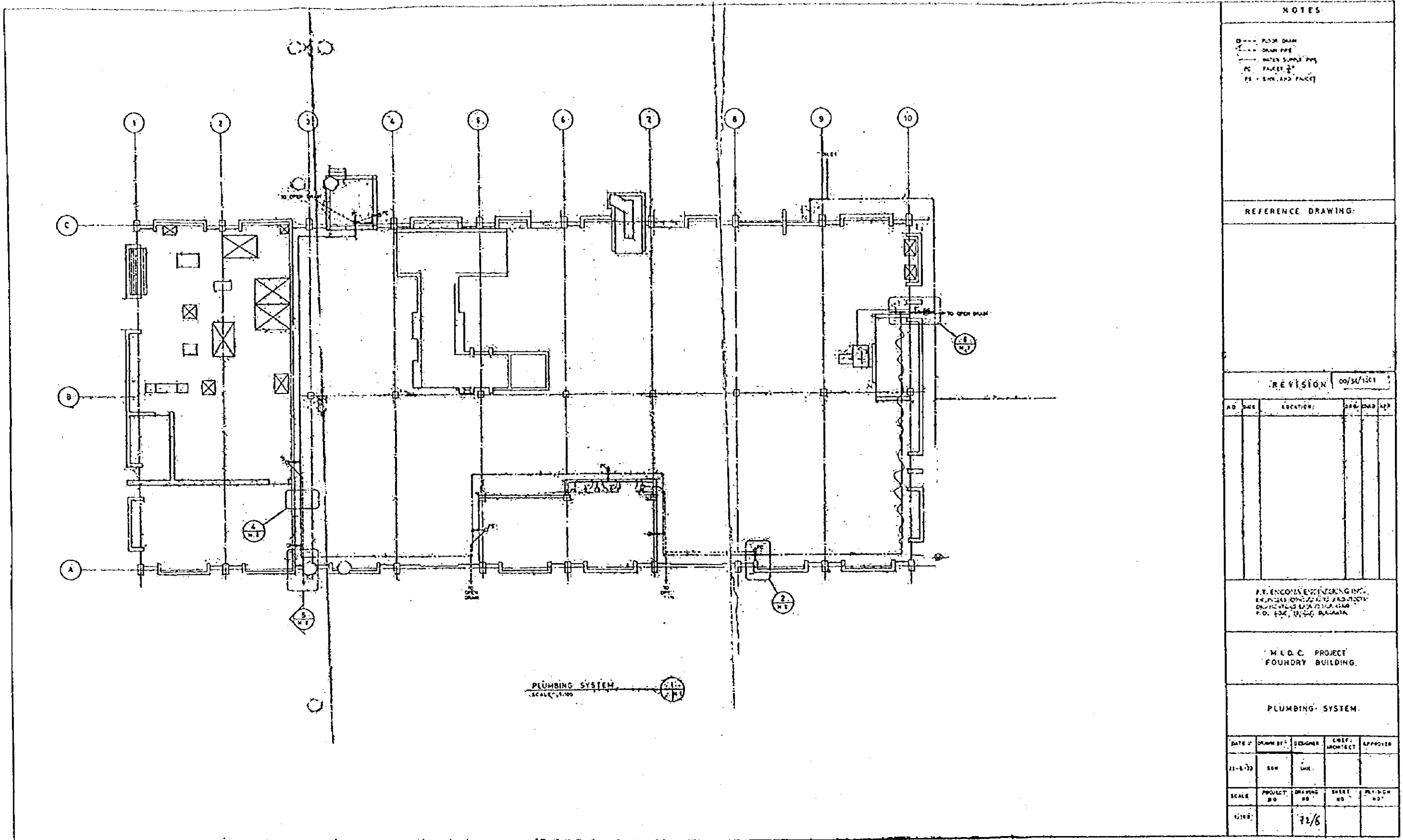
LETAK STOPKONTAK & KRAAN AIR

SCALE: 1:20

SHEET: 72/4

Approved by: *[Signature]*

(7) 配管図 (Plumbing System)



NOTES

REFERENCE DRAWING

REVISION 00/34/1402

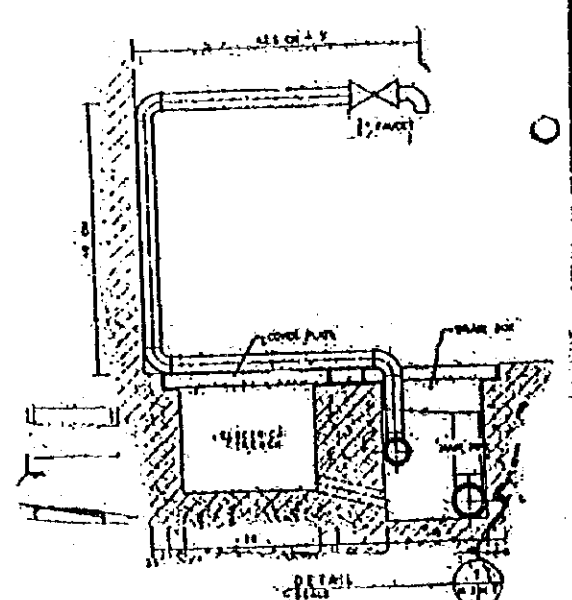
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PT. ENCONVE DE FERRAGEM
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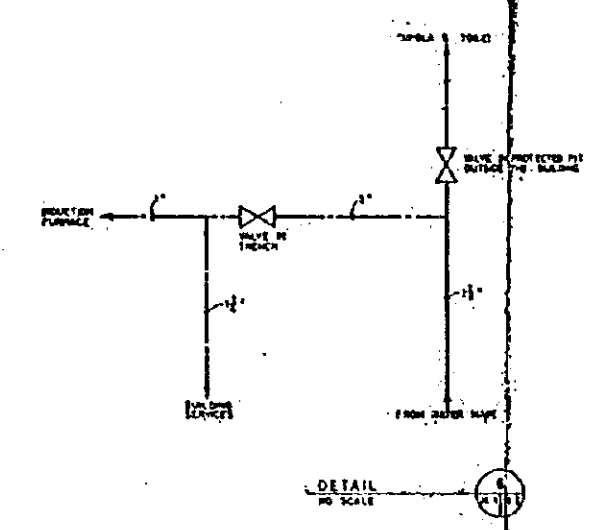
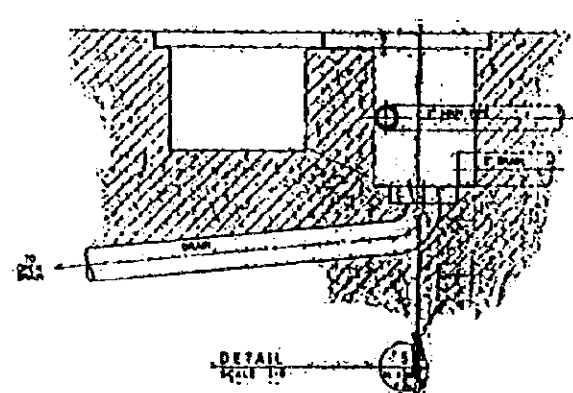
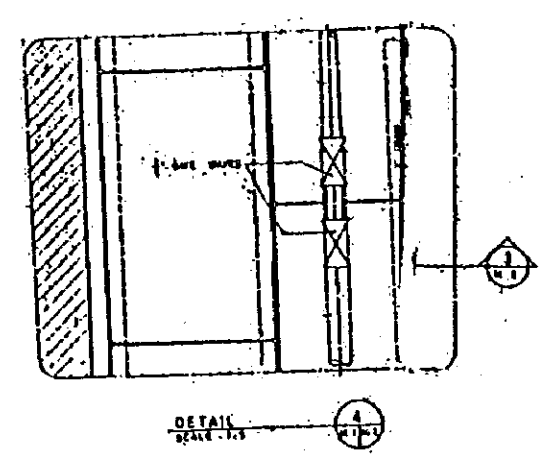
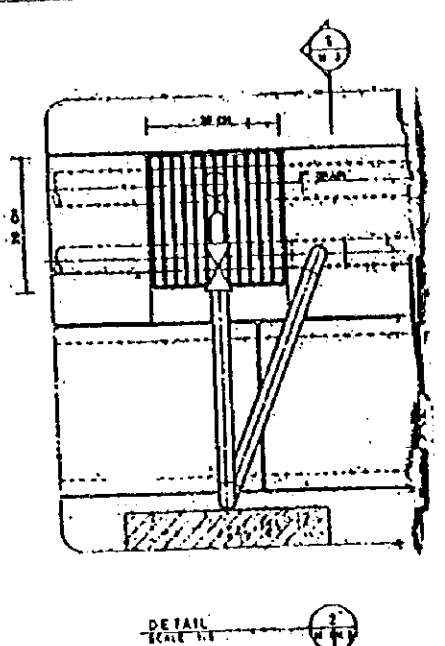
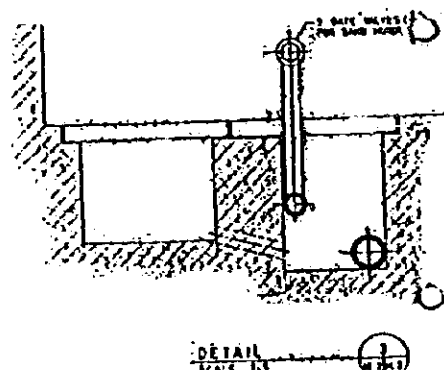
M.L.C. PROJECT
 FOUNDRY BUILDING

PLUMBING DETAILS

DATE	DRAWN BY	DESIGNER	CHECKED BY	APPROVED
11-8-73	SM	SM		
SCALE	PROJECT NO.	DRAWING NO.	SHEET NO.	REV. NO.
1:5		72/8	W-2	



SEE PLAN FOR
 1. SINK
 2. DRAIN
 3. WALL





4 ADB 機材リスト

(1) 鋳造機材 (ダイカストを含む)

FOUNDRY EQUIPMENT (TENTATIVE)

NO.	EQUIPMENT	SPECIFICATION	QUALITY	UNIT PRICE USD
1.	Cold chamber Die Casting	Locking 1800 kN, moving die H x V = 670 x 645 Space between tie bar HxV = 435x435, die height 550 mm (max) 150 mm (min), stroke 100 mm Ejector force 128 kN, Injection force 175-178 kN plunger die 40-80 mm, shot capacity 75-3 kg max projected area 129 -- 518 mm ² .	1	
2.	Low pressure Die Casting	Distance between colum 1100x800, dia 80mm, min/mix opening/stroke = 200/1400/1200, injection force 12 ton, plate stroke 0/450, lower plate dimension 1750 x 90 x 120 fixed, 1590 x 1000 x 80 move.	1	
3.	Electric Annealing Furnace	LxWxH = 1600 x 2000 x 1600 cm. Temp max 1280C 70 kw	1	
4.	Electric Resistance Furnace	Capacity 300 kg Aluminium alloy	2	
5.	Gravity Die Casting	Die size LxWxH = 350 x 450 x 450 cm, textangle 450C	1	
6.	Ladle Heater	Capacity 2 ladles	1	
7.	Thermocouple for liquid metal	Temperature range up to 1200 C	1	
8.	Thermocouple for liquid metal	Temperature range up to 1700C and 500 pcs probe	3	
10.	Carbon Equivalent Meter	Complete with display, computerized and tectip	2	
11.	Moulding Machine	Jolt squeeze, semi otomatic, pin lift, table: 900 x 800 mm 800 x 600 mm 650 x 500 mm	2 2 2	
12.	Airflow Squeeze Moulding Machine	Table size 750 x 560 mm	1	
13.	Cote shooting Machine with gas generator for CO ₂ , Amine and RMF	Volume 10 dm ³ , dimension H x W x Depth = 500 x 600 x 600	1	
14.	Continuous Mixer	Capacity 5 to 6 ton per hour, Sigle arm 4 pump	1	
15.	Molding Box	For Molding Machine: 900 x 800 mm 800 x 600 mm 650 x 500 mm	25 50 25	

16.	Turbine sand Mixer	Capacity 30 ton/hour	1	
17.	Mix Muller	Capacity 2 ton/hour Capacity 1 ton/hour	1 1	
18.	Monorail Overhead Conveyor	Capacity 1 ton	30	
19.	Pneumatic lifting	Capacity 10 ton	8	
20.	Roll conveyor	Capacity 1 ton, width 60 cm	30	
21.	Hand pneumatic Rammer	Long size Short size	2 2	
22.	Hand pneumatic Chisel	Capacity 1 bar	2	
23.	Mold Descending Vibrator machine	Size 100 x 200 cm	1	
24.	Holding Scale	Capacity 1000 kg	1	
25.	Forklift	Capacity 2,5 ton	1	
26.	Screw Air compressor	FAD = 6 M ³ /min, pressure 10 bar, motor 45 kW Complete with dust collector	1	
27.	Carbon and Sulphur Determinator	Ranger C = 0-6%, S = 0 - 0,5% sampler 0.5 gr, Accuracy = c + 1%, S + 2%, for steel, iron, non ferro, alloy, with coomput	1	
28.	Universal milling Machine for pattern making	Spindle colom 200-750 mm, height 470, diameter 1300 mm, swivelling 360 deg, movement 810 x 315 mm	1	
29.	Lathe machine for pattern making	Centre length 1000/1500 mm, height 500 mm, KW 3,5, 18 spindle DZUS; 55, 160, 410, 870, 70, 210, 430, 1200, 100, 220, 610, 1750, 110,300,640, 150, 310, 860.	1	
30.	Double side disc sanding machine	Diameter 400 mm, table L x W = 500 x 250 mm Accuracy 10 minutes, Protactor degree, included Abrasive paper	2	
31.	Belt sanding machine	Table LxW = 750x350, H=960mm, Tilting degree 30/45 Accuracy 15 minutes Power 4 kW, speed 1400 rpm, blower output 19 m ³ /minutes, water gage 224 mm,	1	
32.	Bobbin sander machine	Table LxW = 500 x 500, H = 1050 mm, Tilting degree 20/30 Accuracy 15 minutes, Sanding height 180mm	1	
33.	Band saw	Pulley diameter 630, cutting height 510, width 600 mm Table size 750x750 mm, Cutting degree 45/25	2	

34.	Drill press	Spindle center 500 mm, working height 715 mm and 1215 mm LxW = 490 x 400 mm, 4T slots 12 mm, rotation degree 360 deg.	1	
35.	Coordinate Measuring Machine	3 axis, digital readout, with computer interface and print, measuring toolholder for pins and device	1	
36.	Marking Plate	L x W = 2000 x 1500 mm	2	
37.	Right angle mounting	L x W x H = 150 x 75 x 100 L x W x H = 200 x 100 x 150 L x W x H = 275 x 150 x 200	2 4 2	
38.	Pattern Maker vernier	Measuring range 300 mm 600 mm 1000 mm Srinkage 1%, 1.25%, 1.5% and 2%	6 4 2	
39.	Vernier depth gage	Measuring range 300 mm with srinkage 1, 1.25, 1.5, 2% 150 x 100 200 x 130 250 x 165 300 x 175	2 2 2 2	
40.	Back square Angle	Length of leg/mm 75 x 50 100 x 70 150 x 100 200 x 130 250 x 165 300 x 175	2 2 2 2 2 2	
41.	Atmosphere based furnace	- Temperature max : 1300 oC - Size approx. : 24 x 36 x 15 in - Pump : mechanical pump, hold pump and diffusion pump. - Automatic cycle - Recorder : Temperatur and gas flow recorder - Cold-wall construction for rapid cooldown, complete with heat exchanger. - Include Nitrogen and Argon tank	1	
42.	Hand tools for pattern making	One set, complete	1	
Total				

(2) 試験・校正機材

CALIBRATION AND TESTING EQUIPMENT

PACKAGE I - MECHANICAL TESTING, NON DESTRUCTIVE AND METALLOGRAPHY

NO.	EQUIPMENT	SPECIFICATION	QTY.	OE (USD)	TOTAL OE (USD)
1	Tensile Machine	-Capacity: 100 ton -Servo hydraulic load frame -Stroke: 150 mm or 200 mm -Load cell position upper crosshead -Printer and computer	1		
2	Vickers Hardness Tester	-Automatic loading system -Eyepiece lens: 10x -Objective lens: 20x, 50x, 100x -Display LCD and printer	1		
3	Shore's Durometer	-Benchtop model -Option: dumbel specimen cutter	1		
4	Universal Tensile Machine	-Range: 20 kN, 6 Steps. -Hydraulic, automatic loading	1		
5	Load Cell	-Capacity: 100 ton and 200 ton -Accuracy: 0,1% -Capacity: 10, 50, 100, 500, 1000 kg. -Accuracy: 0,05% Includes: digital amplifier	7		
6	X-Y Recorder	-Input range: 18 -Slewing speed: 80um/s -Pens: 5 pair	2		
7	Torque Transducer	-Capacity: 50 kg.m & 100 kgm -Non linearity: 0,1% -Input impedance: 350 ohm	2		
8	Ultrasonic Corrosion Gauge	-Measuring range: 0,5-200 mm -Resolution: 0,01 mm -Display: 4,5" digit LCD -Receiver bandwidth: 1-15 Mhz -Includes: . Transducer . Charger/Adapter . Test block . Serial interface RS 232 . Printer	1		
9	Ultrasonic Flaw Detector	-Digital portable type -Freq. range: 0,5-15 Mhz -Test range: 0,4-500 mm/div. -Display: 256 col. x 320 row -Sensitivity: 100,0 dB or 0,1 dB selectable resolution. -RS 232C Communication port -Power: 12 VDC/85-264 VAC -Accessories . Sunshade . Int. Alphanumeric datalogger -RS 232 and speed data -23 CAL-NIST cal. certificate	1		

NO.	EQUIPMENT	SPECIFICATION	QTY.	OE (USD)	TOTAL OE (USD)
		-Charger and power cord			
		-Windows based computer			
		-Software			
		-Transducers			
		-Cables			
		-Calibration blocks			
		-Weld Flow Identification kits			
10	Liquid Penetrant Testing	-Set contain: -Cleaning a well-finished surface -Penetrant -Elimination of excess penetrant -Ultraviolet lighting	20		
11	Standard Block for Hardness Tester	-Brinell: 100, 125, 150, 200, 225, 250, 275, 300, 350, 400, 450, 500, 550, 600. -Vickers (HV): 900, 800, 700, 600, 500, 400, 300, 200, 150, 100, 40. -HR 30N: 83, 81, 78, 73, 67, 60, 50. -HR 30T : 78, 72, 62, 52, 42, 32.	1		
12	Magnum	-Automatic cut-off machine -Rotating speed: 1950 rpm -Cut-off Wheel max. 432 mm dia. -Max. round workpiece: 125 mm -Max. Cutting depth: 400 mm -Includes: cut-off wheels	1		
13	Minitom	-Rotating speed: 100-420 rpm -Cut-off wheel. 75-125 mm dia. -Max. round workpiece: 40 mm -Max. Cutting depth: 35 mm -Includes: cut-off wheels	1		
14	Prontopress-2	-Aut. hydraulic mounting press -Cylinder for specimen: 25 to 40 mm	1		
15	Compression Moulding Resins		1		
16	Rotopol-2	-Grinding/polishing machine -Two speed with two motors -Dia. disc: 250 mm -Included: grinding paper	1		
17	Metason	-For cleaning of metallographic Specimen	1		
18	Reflected-lighted Microscope for Bright and Darkfield	-Includes: .Objective equipment .Photomicrography .Video microscopy	1		
19	Pedemin - S	-Complete with automatic lubricator, but without specimen mover plate -Accessories: Specimen mover plate for 3x25 mm, 3x30mm, 3x1.25, 3x1.5, 3x40mm	1		

NO.	EQUIPMENT	SPECIFICATION	QTY.	OE (USD)	TOTAL OE (USD)
20	Brinell Hardness Tester	-Automatic loading system -Testing height 5 to 555 mm -Additional test load 4900 & 9800 N	1		
21	Impact Testing Machine	-Impact energy: 300 Joule -Digital min. reading: 0.1 Joule -Accessories: Notch broching machine Equip. for impact test at low temp	1 1 1		
22	Extensometer Amplifier	-Gauge factor: 2 -Resistance: 120 ohm -Automatic balance	1		
23	Ferrite Content Meter	-Meas. range: 0-50% Ferrite content 0-25% Ferrite content -Meas. Accuracy: $\pm 5\%$ FS -Smallest metal surface: 3 mm dia. -Includes: probe & cables.	1		
24	Test Bar	-Used for milling machine and lathe -Length: 300 mm -Taper: 4 types -Grade: 0	4		
25	Laser Accessories	-Used for Renishaw laser int. -Long range straightness optic PC note book, P 133, 16 Mb of ram Rx 10 rotary table calibration syst. Software	1		
26	High Temperature Test Device	-Temperature range: 200-1000°C	1		
27	Universal Tensile Machine	-Range: 500 kgs. -Hydraulic, automatic loading	1		
28	Portable Eddy Scope	-Freq. range: 100 Hz - 6 MHz. -Sensitivity: Adj. to 100 volts/ohm -Display: 5" digital storage -Low response: 0 to 500 Hz -Adj. gain: 0 to 90 dB. -Probe: differential, absolute, reflect. -Program storage -Serial interface: RS 232 -Power supply: 12 VDC	1		
29	Magnetic Particle Test	-AC/DC Hand Yoke -Power Supply: 12 VDC/240 VAC -Pole cross section: 25x25 mm -Space between legs adjust. from 10 mm to 250 mm -Includes: -Black magnetic ink -B321 kontras paint -Wire brush and duster -Power pack -Spray can -Test block	1		

NO.	EQUIPMENT	SPECIFICATION	QTY.	OE (USD)	TOTAL OE (USD)
		-Permanent magnet leeches			
		-Standard test pieces			
		-ASME field Indicator			
		-Calibrated field indicator			
30	Liquid Penetrant Testing	-Set contain: -Cleaning a well finished surface -Penetrant -Elimination of excess penetrant -Ultraviolet lighting	20		
31	Ultra-Violet Lighting Texture	-With mercury vapor lamp, supplied with transistorized converter.	2		
		TOTAL			

PACKAGE II: TEMPERATURE, PRESSURE AND MASS

NO.	EQUIPMENT	SPECIFICATION	QTY.	OE (USD)	TOTAL OE (USD)
1	Precision Thermometer	-Meas. range: -183 °C to 630 °C -Accuracy: ± 0.001 °C	1		
2	Thermo Hygrograph	-Meas. range: 20 to 100% RH 10 to 50 °C -Accuracy: ± 2% RH / ± 1 °C	10		
3	Thermograph	-Chart rot : day, week and month -Accuracy: ± 3% RH / ± 1 °C	10		
4	Portable Humidity Data Processor	-Meas. range: 0 to 100% RH -40 to 160 °C -Accuracy: ± 0.1% RH / ± 0.1 °C -Includes: probe, sintered bronze, filter and calibration kits.	1		
5	Automatic Controlled Env. Chamber	-Meas. range: 5 to 90% RH 0 to 43 °C -Accuracy: ± 0.1% RH / ± 0.1 °C -Dimension of chamber: 47"x25"x22"	1		
6	Thermistor thermometer	-Number of channel: 5 -Meas. range: -30 to 100 °C -Resolution: 0.02 °C -Accuracy: 0.2 °C -Recorder output: 10 mV per °C -Display: 5 digits -Option: adapter	1		
7	Thermocouple/RTD Loop Calibrator	-Meas. range: 0-1700 °C -Accuracy: 0.2 °C -Display: 4 1/2 digits LCD -Option: AC adapter	1		
8	Thermometer Calibration System	-Meas. range: -35 to 200 °C -Resolution: 0.01 °C -Calibration system: use RS 232C interface-controller program software	1		
9	Cryogenic Monitor	-Meas. range: 1.4 to 475 k -Accuracy: ± 0.1 k -Display: 4 digits LED -Output: 232-C interface, analog.	1		
10	Glass Thermometer	-Meas. range: -38 to 405 °C -Accuracy: ± 0.1 °C -Total length: 379 mm	10		
11	Thermocouple Switch Boxes	-Switch: 10 input -Type: J, K, and T -Connection: mini connector	4		
12	Std. Platinum Resist. Thermometer	-Meas. range: 360 °C -Accuracy: ± 0.1 °C	1		
13	Standard Thermocouple	-Meas. range: -360 to 1500 °C -Accuracy: ± 0.1 °C	1		
14	Thermohygrometer	-Meas. range: 0 to 100 °C	1		

NO.	EQUIPMENT	SPECIFICATION	QTY.	OE (USD)	TOTAL OE (USD)
		0 to 100% RH -Accuracy: $\pm 0.1\% \text{ RH} / \pm 0.1 \text{ }^\circ\text{C}$			
15	Thermocouple Wire	-Type K: dia 0.81 mm, insulation ceramic, fiber, 100 ft-rolls -Type T: dia 1.29 mm, insulation ceramic, fiber, 100 ft-rolls -Type E: dia 1.29 mm, insulation ceramic, fiber, 100 ft-rolls -Option: terminal crimper & thermo crimper and thermocouple	2		
16	Temperature Calibrator	-Meas. range: -150 to 1200 oC -Accuracy: $\pm 0.4 \text{ }^\circ\text{C}$ -Microprocessor controlled	1		
17	Automatic Temperature Cal. System	-Accuracy: $0.02 \text{ }^\circ\text{C}$	1		
18	Multi Channel Anemomaster	-Meas. range: 0 to 5 m/s -Max. channels: 32	1		
19	Air Conditioner	-Power supply: 4 Hp -Power supply: 2 Hp	3 10		
20	Dehumidifier	-Capacity: 400 m3 150 m3 75 m3	1 2 4		
21	Ice Point Reference Cell	-Reference temperature: $0 \text{ }^\circ\text{C}$ -Instrument error: $\pm 0.02 \text{ }^\circ\text{C}$ -Power supply: 220 VAC	1		
22	PH Loop Calibrator	-Meas. range PH simulation: 0 to 14 -Accuracy: $\pm 0.01 \text{ PH Unit}$ -Option: PH test kits.	1		
23	Test Gauge	-Accuracy: 0.1% Full scale -Diameter: 10" -Division scale: 250 -Double scale: kpa and psi -Measuring range: 0-16, 0-30, 0-50, 0-100, 0-200, 0-300, 0-500, 0-1000, 0-1500, and 0-3000 psi.	10		
24	Vacuum Gauge Calibrator	-Meas. range: -14.5 to 300 psi, oil -Accuracy: 0.05% full scale -Readout: LCD display -Unit: psi, bar, kpa, kg/cm ² , mmHg	1		
25	Dead Weight Tester	-Meas. range: vacuum to 500 psi -Accuracy: 0.025% full scale -Includes hand and vacuum pump	1		
26	Torque Calibration	-Capacity: 1 - 25 kg-cm 10 - 200 kg-cm -Accuracy: 0.1% full scale	1		
27	Pressure Calibrator	-Accuracy: 0.05% full scale -Meas. range: 0 to 10000 psi, oil -Display: 2 line x 6 characters -Built in hydraulic hand pump	1		
28	Pneumatic Dead Weight Tester	-Capacity: 70 Bar	1		

NO.	EQUIPMENT	SPECIFICATION	QTY.	OE (USD)	TOTAL OE (USD)
		-Accuracy: 0.03 % -Included: accessories.			
29	Precision Balance	-Capacity: 2000 grams -Readability: 1 mg -Linearity: 0.005 grams -Output built in RS 232-C interface -Accessories: data input, std. glass draft shield acrylic	1		
30	Analytical Mass Set	-Capacity: 1 mg to 1 kg, class E1 -Capacity: 2 kg to 20 kg, class E2	1		
31	Analytical Balance	-Capacity: 300 grams -Readability: 0.01 mg	1		
32	Digital Force Gauges	-Capacity: 50 kg -Accuracy: 0.2% -Output with RS 232-C	1		
33	Mass Comparator	-Range: 1 mg to 500 mg -Range: 1 g to 5 g -Range: 10 g to 50 g -Range: 100 g to 1000 g -Class: E1 -Full automatic mass comparator	1		
34	Mass Comparator	-Range: 2, 5, 10 kg. -Class: E2 -Full automatic mass comparator	1		
35	Thermo Anemometer	-Meas. range: 0.15 - 50 mm/s -Accuracy: $\pm 2.5\%$ of reading -Flow rate range: 0.0001 to 325 m ³ /s	1		
36	Temperature Calibrator	-Meas. range: -45 to 150 °C -Accuracy: ± 0.3 °C -Option: RS 232-C cable, insert for all dia., PC program, tower.	1		
37	Vacuum pressure Calibrator	-Meas. range: -10 to 1000 psig -Accuracy: $\pm 0.1\%$ fs -Display: 2x16 LCD -Option: hand activated press-pump Tubing & fitting for pump	1		
		TOTAL			

PACKAGE III : DIMENSION

NO.	EQUIPMENT	SPECIFICATION	QTY.	OE (USD)	TOTAL OE (USD)
1	Gauge Block	-Ceramic, metric unit -Grade: 00 -1 set: 112 pcs	1		
2	Gauge Block	-Ceramic, inch unit. -Grade: 00 -Blocks per set: 82 pcs	1		
3	Gauge Block	-Range: 125-1000 mm -Grade: 0 and 00 -Inc. clamp holder for gauge block over 100 mm	1		
4	Gauge Block	-Used for micrometer -Grade: 0 -Unit: metric and inch	1		
5	Universal Length Measurement	-Meas. range: 0 - 500 mm -Resolution: 0.0001 mm -Accuracy: ± 0.0001 mm -Includes: accessories for measuring all limit gauges.	1		
6	Standard Scale	-Made from glass -Grade: 00 -Length: 50, 300, 500, and 1000 mm -Included: reading scale 300 mm	1		
7	Sine Bar	-Range: 200 mm -Grade: 0	1		
8	Granite Table	-Size: 400 x 600 mm -Grade: 00	1		
9	Tesa UPC Accessories	-Used for Tesa UPC -Digital comparator: 0.01 μ m -Probe: 3 pairs -Vacuum filter pump -Data processor: Pent. 133	1		
10	Precision Polygon	-Flatness: 0.00005 mm -Number of meas. face: 12	1		
11	Precision Steel Tube	-Steel Hardness 64 RC -Accuracy: ± 2 seconds -Size: 25, 37 and 50 mm.	1		
13	Coating Thickness Calibrator	-Meas. range: 0 to 5 mm -Accuracy: 0.1%	1		
14	Reading Scale	-Length: 300 mm -Graduation: 0.5 mm -Accuracy: $\pm (1.5 + 15L/1000)$	2		
15	Maintenance Kit for Gauge Block		1		
16	QC 10 Ballbar System	-Resolution: 0.1 μ m -Ballbar accuracy: ± 0.5 μ m -Zerodur calibrator acc.: ± 1.0 μ m -Including: -Ball ended bar (length 100 mm) -Interface unit: carbon fibre extension length: 50 mm length: 150 mm	1		

NO.	EQUIPMENT	SPECIFICATION	QTY.	OE (USD)	TOTAL OE (USD)
		length: 300 mm -Magnetic center mount -Magnetic cup -Rs 232 interface & software -Calibration certificate & spanner -Controller -Notebook Pentium 133 -16 MB of RAM -810 Mb hard disk and software			
17	Dial Indicator Repair Tool Kit	Dial Indicator Crystal Setter	1		
18	Precision Test Gauge	-Accuracy: 0.20% -Unit: psi and kPa -Meas. range: 0-10 Bar, 0-25 Bar, 0-50 Bar, 0-300 Bar, and 0-700 Bar.	3		
23	Calibration Tester	-Meas. range: 0 to 5 mm -Accuracy: 0.0002 mm -Meas. range: 0 to 50 mm -Accuracy: 0.002 mm	1		
24	Gauge Block	-Ceramic base 1 & 2 mm -Grade: 0 -1 Set: 112 Pcs	1		
25	Gauge Block Sets	-Ceramic, metric unit, 9 pcs -Grade: 00 -0.991 thru. 0.999 Step of 0.001	1		
27	Heavy Duty Transfer Stand	-Height: 450 mm -Clamping stem dia. 8 mm	2		
28	Laser Hologages	-Range: 10 mm -Accuracy: 0.1 μ m -Display unit -Stand and fixture	1		
		TOTAL			

PACKAGE IV : INSTRUMENT FOR TESTING AND CALIBRATION ELECTRICAL AND ELECTRONICS

NO.	EQUIPMENT	SPECIFICATION	QTY.	OE (USD)	TOTAL OE (USD)
1	Standard Strain Gauge	-Resistance: 120 ohm -With 3 measuring grid	10		
2	Strain Gauge Installation Case	-Contain all 'ct; & cid	4		
3	Bridge Box	-Resistance: 120 ohm	5		
4	Resistance Measuring Unit	-Range number: 3 -Min/max Value: 5 ohm / 50 G ohm -Voltage: 3 V	1		
5	Digital Multimeter	-Display: 5 1/2 digits -Voltage range: 20mV to 1000 V -Accuracy: 0,03%	2		
6	Multi Channel Benchtop Data Logger	-Input: 40 channels -Input voltage and thermocouple -Software and RS 232-C -Signal input: vibration, voice and acoustic	1		
7	Multi Channel Acquisition	-Input: 10 channels -Measured in engineering unit -Data transfer to PC	1		
8	Electronic Mullimeter	-Display: 5 digits -IEEC Interface and True Rms -Voltage range: 2 mV to 1000 V -Accuracy: 0,01%	3		

Calibration and Testing Equipment
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NO.	EQUIPMENT	SPECIFICATION	QTY.	OE (USD)	TOTAL OE (USD)
9	Humidity Chamber	<ul style="list-style-type: none"> -Dimension: 36"x24"x16" -Material: Cast plexiglass -Range: 0 to 100% RH <li style="padding-left: 20px;">-40 to 60 C -Accuracy: 1% and 0,1 C -Including -Dehumidifier -Cooling kits -Printer and PC 	1		
10	Fronius Calibration Car	<ul style="list-style-type: none"> - Shunt: 600A/60 mV - Precision: < 0.5% of the measured - Exact table multimeter: 6.5 digits - Scopemeter PM96 - Revolution count device DT105 - Handmultimeter HP: 0.5 digits - Temperatur sensor - Main voltage: 230 V - Weight: 256 kg - Load limit for the water resistance: <li style="padding-left: 20px;">5.5 kW in permanent operation <li style="padding-left: 20px;">20 kW max. 2 minutes - Testing on the top limit 500 ampere - Additional Installations - Laptop is including: <li style="padding-left: 20px;">-Security technical inspection <li style="padding-left: 20px;">-Test circuitry - Different adapters for torch connections are possible. 	1		
11	Digital Multimeter	<ul style="list-style-type: none"> -Meas. range: 200 mV to 1000 V <li style="padding-left: 20px;">2 mA to 20 A <li style="padding-left: 20px;">200 ohm to 200 Mohm <li style="padding-left: 20px;">200 Hz to 200 kHz -Display: 5 1/2 digits -Accuracy: 0.02% of voltage <li style="padding-left: 20px;">0.07% of ADC -Option: memory card 	2		
12	Multi Product Calibrator	<ul style="list-style-type: none"> -Calibrator: multimeter, oscilloscope, wattmeter, electronic thermometer, data loggers, XY recorder, power harmonics analyzer, current clamp, pannel meter. -Includes: METACAL calibration software and notebook computer 	1		
13	Digital Oscilloscope	<ul style="list-style-type: none"> -Bandwidth: 150 MHz -Real time bandwidth: 2 MHz -Sample rate: 20 MSa/s -Vertical resolutin: 8 bits, 4 channels 	1		
14	Light Meter	<ul style="list-style-type: none"> -Meas. range: 0 to 200 fc -Accuracy: 0.2% reading -Display: 3.5 digits LCD 	1		

NO.	EQUIPMENT	SPECIFICATION	QTY.	OE (USD)	TOTAL OE (USD)
15	Durometer	-Scale: Shore A and D -Graduation: 0.5 -Optional acc : -Calibration stand -Loading weight set	1		
16	Tachometer calibrator	-Range 0 - 10000 rpm -Accuracy 0.1 %	1		
17	Portable Laser Tachometer	-Meas. range: 5 to 95000 rpm -Accuracy: $\pm 0.1\%$ -Max. measuring: 50 ft	1		
18	Noise Level Analyzer	-Dynamic range: 110 dB -Option: RS 232-C, microphone and preamplifier.	1		
19	Vibration Exciter Control	-Freq. range: 1 Hz to 10kHz -Max. output: 10 V -Includes: controls accelerometer, signal, selector and filter.	1		
20	Power Amplifier	-Freq. range: 40 Hz to 10 KHz -Voltage gains: ± 1 dB -Input Impedance: 10 Kohm -Output meter: volt - ampere	1		
21	Power Amplifier	-Freq. range: 10 Hz to 20 KHz -Voltage gains: 0 - 40 dB -Input impedance: 15 Kohm	1		
22	Vibration Exciter	-Force rating: 10 N -Displacement : 6 mm -Frequency: 18 kHz	1		
23	Portable Tracking Balancing	-Consist of vibration preamp, indicating meter & two accelerometers -Includes: accelerometer, filter, balancing program.	1		
24	Accelerometer	-Range: Cubic, 16600 Hz, 3.5 g Cubic, 1 to 25000 Hz Triaxial, 1 to 25000 Hz Hexagonal, 16600 Hz	1 1 1 1		
25	DSA Accessories	-Used for DSA HP 35665A -Option: -Computed order tracking meas. -Real time octave measurement -Swept sine measurement -Curve fit -Arbitrary waveform source -HP Instrument basic -Accelerometer 2 pcs -Memory: 6 Mb.	1		
26	Eddy Current Motor	-Power: 1, 5, 10 kw -Includes: variable speed	1		
27	Pedemin - S	-Complete with automatic lubricator, but without specimen mover plate	1		

NO.	EQUIPMENT	SPECIFICATION	QTY.	OE (USD)	TOTAL OE (USD)
		Accessories: Specimen mover plate for 3x25 mm, 3x30mm, 3x1.25, 3x1.5, 3x40mm			
28	New AB-series, Balance	-Capacity: 300 grams -Readability: 0.1 mg	1		
29	Multifunction I/O Board for IBM PC	-Input: 16 channels -Max. sampling rate: 500 ks/s -Signal input: voltage, strain gauge, and currents. -Includes: 16 MB memory	2		
30	Dynamic Signal Acquisition and DSP Board for IBM PC	-Number of channel: 6 -Resolution: 16 bits	2		
31	Data Acquisition System	-HP-IB port controller -16 channels thermocouple -16 channels strain 120 ohm -16 channels strain 350 ohm -16 channels relay multiplexer -16 channels from C switch -4 channels D/A converter -4 channels universal counter -RS 232 C data command card	1		
32	Digital Converter	-Used for dead weight tester -Display: 8 digits	1		
33	Linear Variable Disp. Transducer	-Meas. range: 0-300 mm -Accuracy: 0.0001 mm	1		
34	PCM10 Metrology Software Kit	Includes: -PCM10 interface card & connector -Metrology software & manual -PC Note book -Min. configuration: -16 mB of ram -Microprocessor pentium 133 -Color VGA display -Equipped with boards for the above mentioned measurements. -Printer port -Port for external mouse -Built-in trackball -AC adapter -Battery-min. 2 hours and supply with rechargeable unit -mouse and mouse pad -Carrying case / bag -All necessary cable, plug and hardware required -Extra extension slot -Includes latest version of DOS, Windows and antivirus software. -The Inkjet printer compatible	1		

NO.	EQUIPMENT	SPECIFICATION	QTY.	OE (USD)	TOTAL OE (USD)
		-Complete with black ink - 4 units -Compatible with laser calibration software, MS DOS & Windows, etc.			
36	Vibration Exciter	-Force rating: 45 N -Displacement : 8 mm -Frequency: 20 KHZ	1		
37	Welding Current Calibrator Inst.	-Arc. voltage range: 0 to 100 VDC -Low ampere range: 0 to 500 ADC -High amp. range: 0 to 1000 ADC -Accuracy: $\pm 1\%$	1		
38	DC Power Supply	-3 channels, Accuracy: 0.5% -3 digits LED -Output 0 to 30 VDC and 0 to 5 Amp.	1		
39	Electrical Energy Analyzer	-Range: 0 to 500 VAC 30 to 600 Hz 0 to 1200 Amp -Accuracy: 1% -Display: LCD, built in printer	1		
41	Prec Integrating Sound Level Meter	-Output: 50 mV/dB. -Memory 512 kb & 1/1 oct. filter -Interface: RS 232-C -Option: calibrator, tripod, wind screen and printer.	1		
42	Watt Meter	-Capacity: 10, 100 kw -Accuracy: $\pm 0.1\%$	1		
43	Portable Flow Meter	-Power: 10 to 30 VDC, 240 VAC -Accuracy: $\pm 0.5\%$ -Display: 16 digits in 2 lines -Option: large sensor, battery sat & charger, scanner, interface with PC.	1		
44	Channel for Spectrometer	- Al Base alloy and CU base alloy Brand HILGER	1		
		TOTAL			
		TOTAL I+II+III+IV			1.390.000

(3) 情報システム機材

INFORMATION SYSTEM EQUIPMENT

NO.	EQUIPMENT	SPECIFICATION	QTY.	TOTAL OE (USD)
1.	Server	Workstation Dual Proc. 167 MHz SCSI HDD 4.5 GB S bus fast SCSI 2 20" 3D graphic WS, Media 2.5X Instalasi dan konfigurasi	2	
2.	PC Pentium Pro	PC II-MMX 200 Mhz, RAM 128 MB HDD 2.1GB, 2MB PCI card, 14" monitor Fast ethernet Instalasi dan konfigurasi	20	
3.	UPS for Server and WS	Interactive UPS smart 1 KVA	2	
4.	Network Software for Product Data Management	Network latest version 100 user	1	
5.	Distribution Software	Latest Version	1	
6.	Manufacturing Software	Latest Version	1	
7.	Financial Software	Latest Version	1	
8.	Master Files Software	Latest Version	1	
9.	ETHERNET HUB	32 Port 10/100 Mbps Automatic Detection	1	
10.	LAN INFRASTRUCTURE	LAN Cabling and conector, Electrical Cabling & Connector, Wiring Duct	40	
11.	LAN INSTALATION AND CONFIGURATION	Setup & Instalation	1	
12.	LASERJET PRINTER		1	
13.	JLTDIRECT EX EXTERNAL PRINT SERVER FOR ETHERNET	Ethernet (10 Base-T, 10 Base-2) Support 3 parallel Port Output	1	
14.	CD Drive Write/Read	CD Drive W/R 12x Multi media CD Drive Modem 33.6 Kbps	2	
16.	Portable VGA Projector	Lightest VGA Projector	1	
17.	Portable LCD Screen	2 x 1 m Screen for LCD Projector	1	
18.	Digital Camera	Professional version Digital Camera	1	
19.	Internet Home Page	HTML file in Web Server	1	
20.	Telephone Line PABX	Auto Ext. 100 line PABX	1	
		TOTAL		350.000

(4) 機械加工機材

MACHINE EQUIPMENT

NO.	EQUIPMENT	SPECIFICATION	QUANTITY	OE (USD)
1.	CNC COORDINAT MEASURING MACHINE	<p>Measuring Range: X= 900mm, Y= 1100mm, Z= 600mm With possibility to install the 4th axis (rotary table). Maximum Workpiece Weight: 1200 kg Accuracy U₁, U₂ (VDI/VDE 2617) E₃ (ISO): U₁ (μm) = 5.4 + L/300 U₃, E₃ (μm) = 6.4 + L/300 Probing Uncertainty V₁, V₂, V₃ (VDI/VDE 2617) R₃ (ISO): V₁ (μm) = 1.8 V₂, V₃ (μm) = 2.2 R₃ (μm) = 3.3 Travel Speeds: Axis = 300 mm/s Vector = 500 mm/s Scanning Speed: 100 mm/s with data acquisition rate 60 points/sec Resolution: 0.5 μm</p>	1	
2.	CNC TURNING END MILLING CENTRE TWIN SPINDLE	<p>Machine bed: The 45° inclined monobloc bed is a compact, torsionally stiff bed with four guideways. All guideways are linear slideways. Spindle motor The 3-phase motor is designed as integrated spindle motor built up thermosym metrically Gauging system X-axis direct incremental gauging system with glass scale Turret disc with 12 stations, indexing through with direction logic, tool reception, cylindrical shank dia. 30, with additional drive for max. 12 driven tools, including milling cycles. Sub-spindle For rear machining mounted on separate slide CNC Control Control type: Path control for simultaneous machining of 2 or 3 axes Types of interpolation: Linear/circular/helical Interpolation range: Linear +100 m Circular + 20 m Dimensions input: Combination of absolute, incremental, Cartesian, polar and cylindrical coordinates</p>	1	

3.	CNC UNIVERSAL MACHINING CENTER WITH HORIZONTAL VERTICAL MILLING HEAD	<p>Machine concept: Closed machine column travelling column) Powerfull digital AC servo drive with high speed range, SK 40 spindle taper *Universal milling head with integrated motor spindle 15 kW and up to 12.000 rpm. Universal milling head for fast and precise swiveling from horizontal to vertical position (short swiveling time (4 sec), with 0,002mm positioning accuracy). Temperature compensation at milling head for workpiece machining with constant accuracy Overload clutch in Z axis Direct measuring system in all axes (no encoder) Thermal influences: • Liquid-cooled main drive • Direct measuring systems (0,001 mm) Axis drives: • Digital axis drives • The axis drives are linked backlash-free without intermediate and angle gear to the recirculating ballscrew Dry running of rotary transmission possible due to automatic, mechanical uncoupling of ceramic seal rings. Technical data Working range X (longitudinal) mm 1250 Y (transverse) mm 800 Z (vertical) mm 800</p>	1	
4.	CNC POLISHING MACHINE	<ul style="list-style-type: none"> • The rigid bridge - type design • Machine's are built in bridge type design: The higher rigidity, torsional and thermal symmetry and vibrational stability are the basic requirements for both high stockremoval and high workpiece accuracy. • For the requirements of the tool and die industry where soft and hardened materials (up to 50 HRC) can be produced to finish-quality, reducing and in many cases completely eliminating - the EDM process, including programming and machining of electrodes • Pallet changer including 2 pallets 900 x 550 mm swarf conveyor. <p>Machining Area X axis mm 700 Y axis (portal saddle) mm 550 Z axis(spindle head) mm 500 Feed/Axis Drive System</p>	1	

		Feed power Y; X N (100% ED) 8,500 Feed power Z N (100% ED) 12,500 Feed range mm/min 1-10,000 Rapid traverse X;Y/S m/min 30/20 Travel Measurement System Direct resolution mm 0,001 Machining Spindle Drive power 100% / 40% ED kW 10/15 Torque 100% / 40% ED Nm 87/130 Speed range rpm 1- 8,000 Tool support DIN 69871-A SK 40		
5.	EDM DIE SINKING MACHINES	<p>The outstanding feature of the machine concept is the optimum design of all system components comprising:</p> <ul style="list-style-type: none"> * a powerfull generator * a high-resolution servo control * a programmable Z axis * programmable X and Y axes * an easily accessible worktank * programmable flushing * floppy drive <p>The new generator was developed for high productivity and, with Adaptive Current Control/Optimisation as well as WATCHDOG, offers a wide variety of functions for safeguarding and optimising processes. This allows high roughing and finishing speeds under all erosion and flushing conditions.</p> <p>The machine's captivates with its simple complete solutions in a technical and design respect, ensuring a high degree of reliability and service life:</p> <ul style="list-style-type: none"> • for long service life and high stability: a study (240 N/mm₂) C-frame structure made of fine-grained grey cast iron • for rapid and precise positioning: high-resolution servo drive for the Z axis • for high positioning accuracy: stick-slip-free roller-bearings on X,Y and Z axis guides and recirculating ball spindle for the Z axis. <p>Efficient flushing and filter technology</p> <p>With programmable pressure, suction and pulse flushing, the machine ensures optimum erosion conditions.</p>	1	
6.	CNC WIRE CUT EDM	Characteristics	1	

	<ul style="list-style-type: none"> * Separate control for the lower (X,Y) and upper (U,V) axes * Cutting height up to 400 mm due to long travel of vertical (Z) axis * Surface quality up to $R_a = 0.35 \mu\text{m}$ with excellent linearity * Accuracy of fit with minimal play in the μm range <p>The Cartesian coordinate system (X, Y and U, V) permits virtually any 3 D cut with utmost precision:</p> <ul style="list-style-type: none"> * Contour with input of individual transition radii. Precise taper cutting with the PH pivot-head mechanical system * Pivoting guide heads offer wire inclinations of up to 30°. * Wire is not stressed by diversions * Wire guides and coaxial flushing track wire position, so cutting conditions remain constant, with best linearity on inclined surfaces, hence increased performance * Wide range of wire diameters can be used without retooling * A wire chopper removes used wires neatly and simply. <p>Features</p> <ul style="list-style-type: none"> * The automatic wire-threading system makes it possible to machine linked geometries, automatically rethreads after a wire break, and automatically advances to the next position (automatic start-hole detection) if there is no start hole at the programmed position. <p>A wide range of technologies can be automatically retrieved to suit the current material pair, and surface qualities of $R_a - 2.0 \mu\text{m}$ are achievable with trim cuts.</p> <p>A special electrical circuit safeguards the workpiece against corrosion, and the use of appropriate trim-cutting technology eliminates the <<white layer>>.</p> <p>A 486 processor running at 66 MHz coupled with 170 MB of memory insures extremely fast data processing</p>		
TOTAL			2.950.000

(5) CAD/CAM機材

CAD/CAM EQUIPMENT

NO.	EQUIPMENT	SPECIFICATION	QUANTITY	TOTAL OE (USD)
1.	Workstation for High end level CAD/CAM	Ultra spark processor 167MHz, RAM 128 MB, HDD 2,1 GB 19" monitor Sun PC Card, 2.5X media Installation & configuration	2	
2	Workstation for High end level CAD	Ultra spare processor 200MHz, RAM 128 MB, 2 hardisk 2,1GB dan 4,2GB, Tape drive 12-24GB 19" monitor 2M VGA Card Installation & configuration	1	
3.	PC for low level CAD/CAM	PC pent. pro200 Dual Processor 64MB 2,1GB hardisk, 4MB card monitor 14" Monitor + Installation & configuration	4	
4.	Peripheral and supporting hardware for CAD/CAM Network	Smart UPS for 20 PCs Fast ethernet switch + Support LAN installation & configuration Color inkjet Plotter (CADjet) Jet direct external print/plot server	3 1 3 1 1	
5.	PC for medium level CAD/CAM	PC pent. ProII Dual processor 128MB, 2,1GB, 8MB PCI card Monitor 14" + Installation & configuration	2	
6.	DNC System	PC pent. pro200 Dual processor 64MB, Hardisk 2,1GB, 4MB PCI card Monitor 14"	1	
7.	Software for high end CAD	Capable for hybrid, parametric, solid modelling	1	
8.	Software for high end CAD/CAM	Real 3D, 5axis milling, enable NC programming	1	
9.	5 axis high end CAM software	Multiaxis, tool axis, profiling controller and swarf	1	
10.	CAE plastic software analysis	User interface, mesh creation, element library, modification	1	
11.	CAE stress analysis	User interface, mesh creation, element library and modification	1	
12.	CAE kinematic analysis	Definision, joint type, formatte analysis	1	
13.	Software for low end CAD	3D wireframe, surface and solid model shading, interface	1	
14.	Software low end CAD/CAM	NC part program, post processor, geometry, shading, interface	1	
15.	Report generator software	Latest Version	1	
16.	CAD customizing software	Latest version	1	
17.	Direct translator software	Latest Version	1	
18.	Personal IGES Translator	Translating IGES Vise Versa	1	
19.	Medium level CAD/CAM software	Latest version		
20.	Reverse engineering software	Digitize point, manipulation, triangulation, construction	1	
21.	Engraving Software	Latest version	1	

22.	Flexible Manufacturing System	Control of machine tools, material handling system, monitoring the performance of the system and scheduling production : 1) Universal Machining Center, 2) Tool Management (tools changer) 3) Material Handling Management (pallet system) 4) Material Feeding & drawing system (robot system) 5) Computer for tooling design, high end CAD system and CAM system	1	
TOTAL				950.000

(6) 溶接機材

WELDING EQUIPMENT

NO.	EQUIPMENT	SPECIFICATION	QUANTITY	TOTAL OE (USD)
1.	SMAW	DC Caps. 400-500 Amp Welding cable 5000 BDE 0250 MSLF Clamp 350 Amp Holder 350 Amp	20 Unit 12m/unit 1 pcs/unit 1 pcs/unit	
2.	GMAW	Caps. 450-600 Amp. Water cooling gun Water cooling unit Push and pull system, dia. Rol 0.8-1.6 mm Aluking standard gun (154 mm tip, water nozzle, 400 Amp. At 100%	3 unit 1 pcs/unit 1 pcs/unit 1 pcs/unit	
3.	GTAW	AC/DC, HIGH FREQUENCY Caps. 350 Amp TIG torch Water cooling torch Water cooling unit	3 unit 1 pcs/unit 1 pcs/unit 1 pcs/unit	
4.	SAW	Power source DC 1500 Amp. Coulomn and boom size 3x3 to 5x6 Head for plate wire (cladding) Addition of metal powder unit Roller/rotator Positioner Accessories: Motorized column and boom Platform power source-end mounted wire reel Operator seat Operator platform Access ladder and walkway	 1 unit 1 unit 1 unit 1 unit 1 unit 1 unit 1 unit 1 unit 1 pcs 1 pcs	
5.	Plasma Welding	Capacity 300 – 350 Amp, with: Programmer Water cooling unit Water cooling torch Plasma arc spray equipment Manipulating equipment (seamer and positioner	1 unit 1 unit 1 unit 1 unit 1 unit 1 unit	
6.	Plasma Transfer Arc	Complete with: Power source Control console Kooltronic water cooler, System hose and regulator kit Eutronic gap system torch	1 unit 1 unit 1 unit 1 unit 1 unit	

7.	Continuous Resistant Machine Longitudinal Purpose	Program modul, electrode dia, 5-6 inch timer and power module, electrode force 6,3 kN, coompressor air supply 6,6 Bar Transformer caps, 80 kVA	1 unit	
8.	Spinning Machine	Caps. 1 inch thickness, hydrolic pressure range 0-15 mPa, three roller min, dia. 600 mm	1 unit	
9.	Cutting Machine	Complit with: Thresser, photo electrictracer control scale 1:1 max. circle cut dia, 1000 mm, tracing length: 1000 mm tracing width: 1250 mm main supply 2330 V/50 Hzinput power 200 VA	1 unit	
10.	Brander Cutting	Oxy-acetylene cutting complete with regulator	2 unit	
11.	Cutting Pipe Equipment	Electric power tool	2 unit	
12.	Welding Speed Control Equipment Digital		2 unit	
13.	Polishing Machine	Dynastraight kitDynastraight tooldynachusion pneumatic wheelWheel inflation tool (1/4" NPT) Dynaswivel (1/4" NPT) Arbar 1/2" dia. Abrasives	1 unit	
14.	Gas Mixer	For Argon, Oxygen, CO ₂	1 unit	
15.	Automatic Welding Recorder	The instrument is inteeded use to control (measured) weld current arc, voltage, wire speed for MMA, GTAW, GMAW, SAW, Plama. Currnet range 0-1000 Amp.Arc voltage 0-100 Vwire speed 0-20 m/sec	1 unit	
16.	Heating Element	Complete with: Module pack programmer Twin heat module, indicator temp. 1000C Recorder, thremocouple attachment Finger element number 20 and 42 (each contain 5 unit)	1 unit	
17.	Radiography	complete with : Main Components : X-ray tube nead GMF-306D (300 kV-6 mA) with forced cooling gas insilated GMX type, universal control case, complete with safety devices againts wrong operations and tube overheating, uminous and shock proof instrument, electonic stabilazation of mA and volt.X- Ray cable 20 m long with quick switch-in	1 unit	

		<p>connectors. Mains cable 10 m long with quickswitch-in connectors. Set of field limiter (1 shutter cap, 1 limiter 10x48, 1 limiter 30x40). Telescopic centre finder Accessories (fuses, use, manual, etc). 2 transport trunks.</p> <p>Exposure times slide rule. Main Feature : Duty cycle : 50% Volt adjust: 100-300 kV Electronic stabilization mA and kV Voltage pre-reading (kV) with automatic rise. X-Ray beam: 50' Focal spot: 3x3 mm Tube heat: 210 - height 780 - kg 38 Control case: 270x360x460 mm - kg 28 Optional : Truck with hydraulically operated liftingstand complete with fork, flanges and belt. Survey meter, detector for Gamma and X-ray, scale: 0-10 mR/h, 0-100 mR/h, 1-1000 mR/h. Badge holder (for film holder) Pocket dosimeter 0-200 mR Densitometer digital Viewer, 220 V, 900 W (c/w 6 peshalogen lamps) Automatic processing fld, stucturix NDT-M</p>		
18.	MIG/MAG Puls Synergic	<p>Transpuls Synergic 330 Power Source Main Voltage 3x380 V Welding Power 69 %, DC = 12.3 KVA Welding Current: 300 A at 60 DC 210 A at 100% DC OVC = 50 V Attachment : Wire feed, Cooling unit, TPS remote control, TR-22 P</p>	1 unit	
19.	MIG/MAG Puls Synergic	<p>Transpuls Synergic 450 Power Source Main Voltage 3x380 V Welding Power 100 %, DC = 17.2 KVA Welding Current 300 A at 60 DC 210 A at 100% DC OVC = 50 V Attachment : Wire feed, Cooling unit, TPS remote control, TR-34 MIG</p>	1 unit	
20.	TIG Puls System	<p>Transtig 330 standard Main Voltage 3x380 V Welding Current 330 A, 50% DC 300 A, 60% DC OVC = 50 V Cooling device FK 7, and console for FK-7, including welding & lants cable Transtig 330 gas coated, and Transtig 330 water cooled torch</p>	1 unit	

		Attachment : TR-50-1, remote regulator TR-51 .		
22.	TIG Puls System	Transtig 450 standard Main Voltage 3x380 V Welding Current 450 A, 60% DC and 360 A at 100% DC OVC = 50 V Cooling device FK 7, and console for FK- 7, welding & cable Transtig 450 water cooled Attachment : TP-4-ISP	1 unit	
23.	TIG	TIG magic wave 2600 CEL Main voltage 3x380 V Welding current 260 A at 60% DC and 230 A at 100% DC, OCV = 80 V Attachment : Remote control min. 2600 CEL Cooling unit FK 2600, 50 Hz, Main voltage 230/400	1 unit	
24.	TIG	Transtig 3000 Main voltage 3x380 V Welding current 300 A at 65% DC and 260 A at 65% DC and 260 A at 100% DC OCV = 80 V Attachment : Cooling unit FK 2601, 50 Hz, Main voltage 230/400	1 unit	
25.	TIG Puls	Magic Wave 200 Main voltage 3x380 V Welding current 20-200 A Welding current 300 A at 60% DC OCV = 60 V Attachment : Cooling unit FK 7, Electrode & part cable, remote control & TR-50-1, carriage console for FK 7	1 unit	
25.	TIG Puls	Magic Wave 300 Main voltage 3x380 V Welding current 10-300 A Welding current 300 A at 60% DC OCV = 50 V Attachment : Cooling unit FK 7, Electrode remote control unit TP-3, Tig remote control TR- 51 & TP-2	1 unit	
25.	TIG Puls	Magic Wave 450 Main voltage 3x380 V Welding current 10-450 A Welding current 450 A at 60% DC OCV = 80 V Attachment : Cooling unit FK 7, Tig remote control TR-51 & TP-2	1 unit	

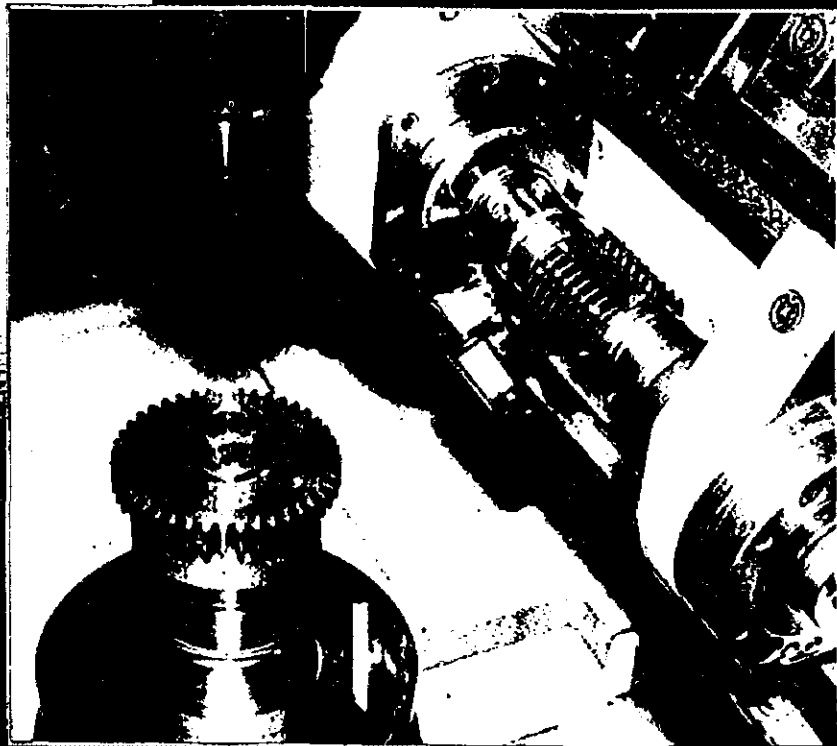
26.	MAG High deposition welding	Time synergic Main voltage 3x380 V Welding current 3 - 450 A Welding current 450 A at 100% DC Welding voltage MAG 0-50 A TIG 0-55 V OCV = 50 - 80 V Attachment : Cooling unit FK 71 R, time standard Torch and time 70I, remote control TR 23 P and TR 22 P and cable	1 unit	
27.	Electrode drying equipment	Hafman electrode and powder drier PETS-1 for electrode & powder Dimension 960 mm length, 850 mm wide and 1530 mm high, Power 2,4 KW	1 unit	
Total				1.135.000



BADAN PENELITIAN DAN PENGEMBANGAN INDUSTRI

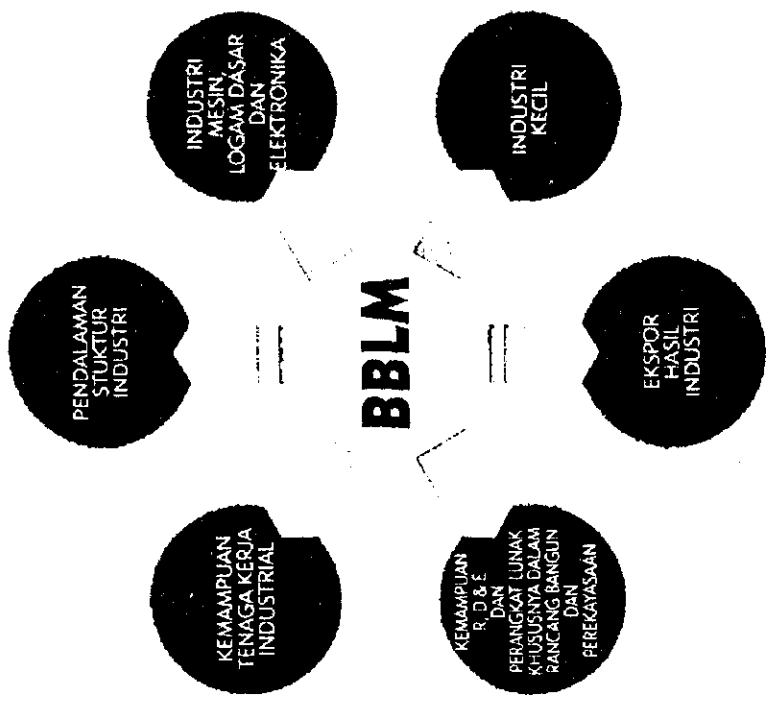
BALAI BESAR PENGEMBANGAN INDUSTRI LOGAM DAN MESIN

**AGENCY FOR INDUSTRIAL RESEARCH AND DEVELOPMENT
INSTITUTE FOR RESEARCH AND DEVELOPMENT OF
METAL AND MACHINERY INDUSTRIES**

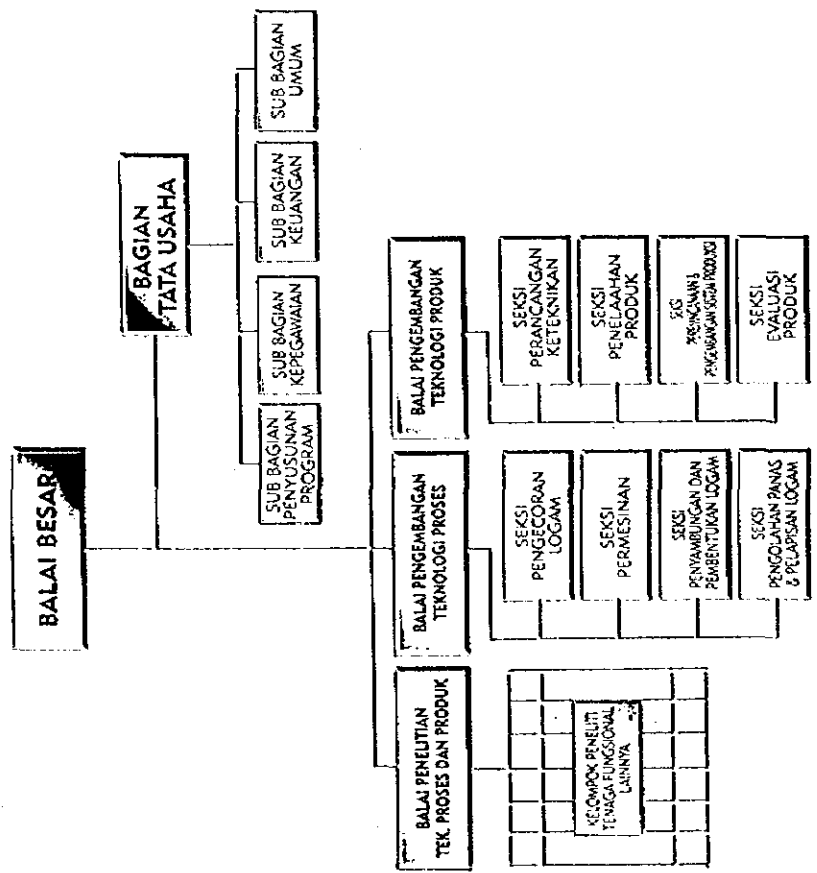


**JALAN SANGKURIANG NO.12 KOTAK POS : 1154 BANDUNG 40135
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PERANAN BBLM DITENGAH-TENGAH KERANGKA LANDASAN
UNTUK TINGGAL LANDAS SEKTOR INDUSTRI



STRUKTUR ORGANISASI BBLM BERDASARKAN SK MENTERI PERINDUSTRIAN
TANGGAL 25 APRIL 1988 NO. 123/MSK/4/1988



BALAI BESAR LOGAM DAN MESIN

Adalah unit pelaksana teknis dibidang penelitian dan pengembangan industri logam dan mesin dalam lingkungan Departemen Perindustrian.

FUNGSI

Melaksanakan kegiatan penelitian dan pengembangan dalam bidang :

- Proses pengecoran logam.
- Proses permesinan.
- Proses penyambungan dan pembentukan logam.
- Proses pengolahan panas dan pelapisan logam.
- Perancangan keteknikan.
- Penelaahan spesifikasi produk.
- Perencanaan dan pengembangan sistim produksi
- Standarisasi dan evaluasi produk.

FASILITAS BALAI

Dalam melaksanakan tugas dan fungsinya, BBLM memiliki sarana dan fasilitas laboratorium, antara lain :

1. Pengecoran Logam, dilengkapi oleh mesin dan peralatan untuk pembuatan model (pattern), cetakan (modul) dan dapur pelebur (Cupola, Rotary & Induction Furnace) serta Shot Blast Furnace.
2. Pemesinan, ditunjang dengan sejumlah mesin perkakas, termasuk mesin EDM dan CNC.
3. Penyambungan dan Pembentukan Logam, dilengkapi dengan mesin-mesin las listrik, zicromatik, vetromatik, oksiasetililin dan mesin-mesin pembentuk plat.
4. Pengolahan Panas dan Pelapisan Panas, terdapat beberapa tipe dapur/tungku, antara lain : Electric Hardening Furnace, Electric Chamber Furnace dan Salt Bath Furnace.
5. Perancangan Keteknikan, yang dilengkapi dengan CAD & CAM dengan seperangkat komputer PC 386.
6. Beberapa Laboratorium Pendukung Lainnya, yaitu :
 - a. Laboratorium Kimia, untuk meneliti Komposisi Campuran Logam.
 - b. Laboratorium Logam (Metalography), untuk Pemeriksaan struktur Logam.
 - c. Laboratorium Mekanik (DT&NDT), untuk mengukur tegangan tarik, kekerasan, impact dan dilengkapi peralatan ultrasonik dan radiography
 - d. Laboratorium ukur Dimensi (Metrology) untuk mengukur presisi & kalibrasi dengan cara mekanik, optik dan elektronik.
7. Dan tersedia sarana pendukung berupa : Perpustakaan, Asrama, Ruang Seminar dan Kelas.

Institute for Research and Development of Metal and Machinery Industries (IRDMMI) is an implementing institution for research and development of metal and machinery industries under the Agency for Industrial Research and Development - Ministry of Industry.

FUNCTION OF IRDMMI :

To carry out research and development activities in the areas of :

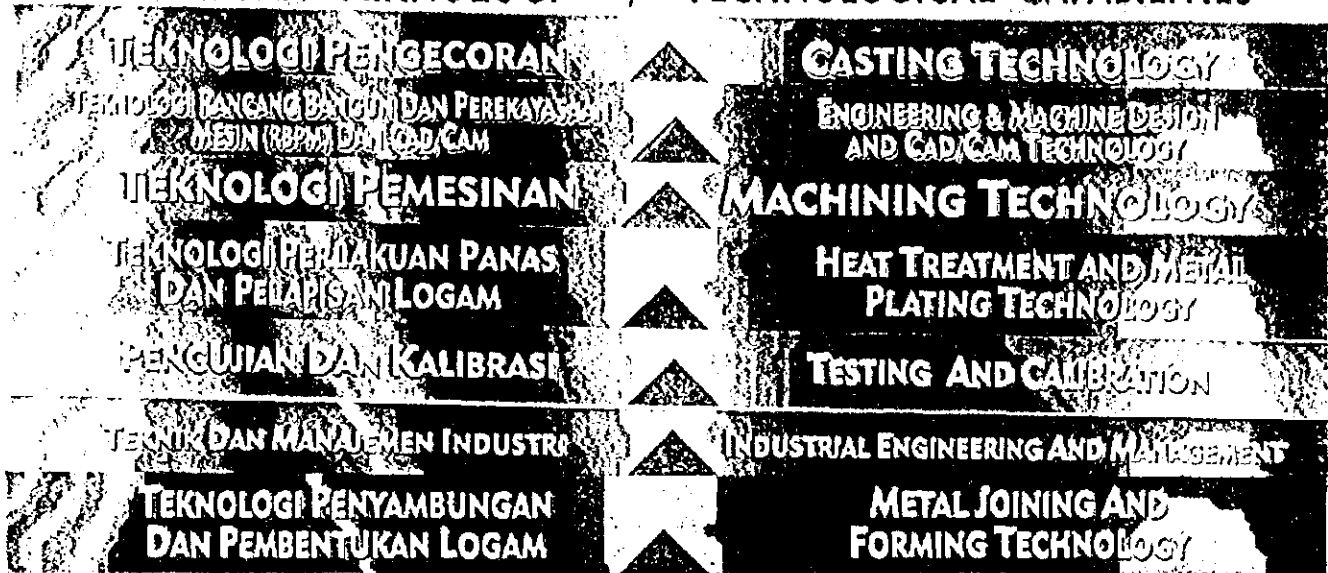
- Casting Process.
- Machining Process.
- Metal Joining and Forming Process.
- Heat Treatment and Metal Plating Process.
- Engineering Design.
- Product Specification Analysis.
- Standardization and Product Evaluation

FACILITIES OF IRDMMI

In carrying out its task and function, the IRDMMI has the following facilities :

1. Foundry Laboratory, equipped with pattern and mould making equipment, cupola, rotary & induction furnaces and shot blast.
2. Machining Laboratory, supported by a wide range of machine tools including EDM and CNC machines.
3. Construction and Welding Laboratory, equipped with electric welding machines, zircomatic, vertomatic, oxy-acetylene and plate forming machines.
4. Heat Treatment and Metal Plating Laboratory with various furnaces, among others : Electric Hardening Furnace, Electric Chamber Furnace and Salt Bath Furnace.
5. CAD & CAM Centre
6. The other supporting laboratories are :
 - a. Chemical Laboratory and analyse metal composition.
 - b. Metallographic Laboratory to inspect metal structure.
 - c. Mechanical Laboratory (DT&NDT) to measure tensile strength, harness & impact that is equipped with ultrasonic and radiography equipment.
 - d. Metrology Laboratory to measure precision and calibration with mechanical, optical and electronic systems.
7. And there are some more supporting facilities, such as : library, dormitory, class room and conference hall.

KEMAMPUAN TEKNOLOGI / TECHNOLOGICAL CAPABILITIES



KEMAMPUAN BALAI

Sebagai wujud konstrubusi Balai dalam pengembangan industri Logam dan mesin, BBLM telah mampu memberikan bantuan jasa pelayanan teknis kepada industri dalam bentuk :

1. Rancang Bangun dan Perencanaan Untuk Mesin & Peralatan Pabrik, melalui pembuatan disain produk, mesin, & peralatan pabrik.
2. Pembuatan Prototipe dan Produk, termasuk untuk pembuatan Jig & Fixture serta Mould & Dies.
3. Pendidikan dan Pelatihan (Diklat), untuk berbagai bidang, antara lain :
 - a. Perancangan (CAD & CAM).
 - b. Pengecoran Logam (Ferro & Non Ferro).
 - c. Pemesinan (termasuk CNC).
 - d. Pengelasan (SMAW, GTAW, GMAW & SAW).
 - e. Pengolahan Panas & Pelapisan Logam.
 - f. Manajemen Produksi & Pemeliharaan.
4. Pengujian dan Kalibrasi.
5. Konsultasi dan Supervisi, baik di bidang teknologi proses pembuatan maupun dalam bidang pengolahan industri (Manajemen Produksi dan Pemeliharaan).
6. Dalam kegiatan penyebaran informasi hasil penelitian dan pengembangan dalam rangka alih teknologi kepada industri, BBLM disamping melaksanakan diklat untuk industri juga melakukan kegiatan :
 - a. Publikasi (Majalah Metal Indonesia)
 - b. Pameran & Peragaan.
 - c. Lokakarya & Seminar.

CAPABILITIES OF IRDMMI

As the realization of its contribution to the development of metal and machinery industries, the IRDMMI has been able to provide technical service assistance to industries in the forms of :

1. Engineering and design of industrial machinery and equipment trough product design and prototyping activities.
2. Prototyping and product manufacturing, including the manufacturing of jig and fixture and mould & dies making.
3. Education and training (Short Courses) for an extensive range of training subjects, among others :
 - a. Design (CAD & CAM).
 - b. Casting (Ferrous & Nonferrous).
 - c. Machining (including CNC).
 - d. Welding (SMAW, GTAW, GMAW & SAW).
 - e. Heat Treatment and Metal Plating.
 - f. Production and Maintenance Management.
4. Testing and Calibration
5. Consultancy and supervision, either in the field of manufacturing process technology or in the field of industrial management (Production and Maintenance Management).
6. In its activity to disseminate information pro-cured trough research and development in the frame of technology transfer to industries, the IRDMMI not only conducts short courses for industries but also performs the following :
 - a. Publication (Indonesian Metal Magazine)
 - b. Exhibition and Demonstrations.
 - c. Workshop and Seminars.



FOKUS

Untuk saat ini difokuskan pada teknologi pengecoran logam dengan cetakan pasir (sand casting) untuk besi cor, besi nodular, baja karbon, baja paduan rendah dan paduan tinggi, logam non ferro paduan dasar tembaga dan paduan dasar aluminium.

BIDANG KEAHLIAN

- *Teknik pembuatan pola dan kotak ini :*
 - Bahan Kayu
 - Bahan epoxy resin
- *Teknik peleburan dan pemuatan logam*
 - Logam besi cor dengan tenur kupola, tenur putar dan tenur listrik induksi
 - Logam nonferro dengan tenur krus
- *Teknik pembuatan cetakan dan inti*
 - Pasir cetak basah (green sand moulding)
 - Pasir cetak CO₂
 - Pasir Cetak resin (croning proses)
 - Pasir cetak mengeras sendiri : furan, pepset
- *Teknik pembersihan coran*
 - Visual
 - Dimensional
 - Komposisi Kimia
 - Cacat permukaan
 - Cacat Dalam
- *Keteknikan penuangan dan pengecoran logam (foundry engineering)*
 - Teknologi pasir Cetak
 - Teknologi reklamasi pasir cetak
 - Rancangan sistem saluran tuang/gating system
 - Rancangan sistem penambah air/riser
 - Metalurgi pengecoran
 - Analisa cacat tuang

FOCUS

At present casting technology activities are focused on casting technology with sand casting for cast iron, nodular iron, carbon iron, low and high alloy steel, non-ferrous metal with copper and aluminium basic alloy.

FIELDS OF EXPERTISE

- *Pattern and Core Box Making Technique by using :*
 - Wood Material
 - Epoxy resin material
- *Metal Melting and Merging Technique for :*
 - Cast iron with cupola furnace, rotary furnace, and induction electric furnace
 - Non-ferrous metal with "Curse" Furnace
- *Mould and Core Making Technique :*
 - Green sand moulding
 - CO₂ moulding
 - Croning proses
 - Furan and pepset moulding
- *Costing Cleaning Technique :*
 - Visual
 - Dimensional
 - Chemical composition
 - Surface defect
 - Inside defect
- *Foundry Engineering :*
 - Moulding sand technology
 - Moulding sand reclamation technology
 - Design of casting system / gating system
 - Additional system / riser design
 - Foundry metallurgy
 - Casting defect analysis

- **Manajemen Produksi Pengecoran**
 - Perencanaan dan pengendalian produksi
 - Perhitungan dan analisa biaya produksi
 - Pengawasan mutu

TENAGA AHLI

Sarjana teknik : 8 orang

Teknisi : 15 orang

RENCANA PENGEMBANGAN

- Aplikasi komputer untuk casting design : solidification simulation software, gating & riser design (dalam waktu dekat)
- Pembuatan inti : core shooter, shell core machine.
- Pressure die casting technology
- High pressure moulding machine
- CNC pattern making

PROGRAM JPT YANG DITAWARKAN

• PELATIHAN/TRAINING

Pelatihan/training secara modul untuk tingkat dasar, tingkat menengah dan tingkat lanjut dalam bidang :

- Teknik pembuatan pola (pattern making)
- Teknik pencetakan (moulding)
- Teknik Peleburan dan penuangan logam melting)
- Pelatihan/training atas dasar permintaan yang menyangkut semua aspek teknologi pengecoran logam

• LITBANG (R & D)

Litbang untuk pengembangan produk maupun pembuatan produk cor (casting) baru dan untuk peningkatan/perbaikan proses maupun penerapan proses-proses pengecoran baru yang diperlukan oleh industri pengecoran.

• SUPERVISI

Supervisi untuk peningkatan penguasaan teknologi pengecoran di industri, peningkatan mutu produk cor (casting) dan peningkatan efisiensi.

• KONSULTASI

- Konsultasi untuk mengatasi masalah-masalah teknis-teknologis yang dihadapi oleh industri pengecoran.
- Studi pra-kelayakan dan studi kelayakan untuk pendirian industri pengecoran.
- Plant design industri pengecoran baru dan plant redesign industri pengecoran lama.

• MANUFAKTUR/PEMBUATAN PRODUK

- Atas dasar pesanan membuat produk-produk cor yang tidak atau belum diproduksi oleh industri pengecoran di dalam negeri atas dasar pesanan.

- **Management of Casting Production :**
 - Planning and production control
 - Calculation and Production cost analysis
 - Quality control

EXPERTS

Engineering Graduates : 8 persons

Technicians : 15 persons

DEVELOPMENT PLAN

- Computer application for casting design : solidification simulation software, gating and riser design (in the near future).
- Core making : core shooter, shell core machine.
- Pressure die casting technology
- High pressure moulding machine
- CNC pattern making

TECHNICAL SERVICE PROGRAMS OFFERED ARE :

• TRAINING

Module system training for basic, intermediate and advanced levels in the fields of :

- Pattern making
- Moulding
- Melting
- Training covering all foundry technology aspects available upon request.

• RESEARCH AND DEVELOPMENT

Research and development activities include : Product development or manufacturing of new casting products, Improvement of manufacturing process, and Implementation of new casting process required by casting industries.

• SUPERVISION

Supervision is intended to upgrade the mastery of casting technology in industries, to improve casting product quality and to increase efficiency.

• CONSULTANCY

- Consultation to overcome technical problems faced by casting industries.
- Pre-feasibility study for establishing casting industry.
- Plan design for a new casting industry and plant redesign for the old casting industry.

• PRODUCT MANUFACTURING

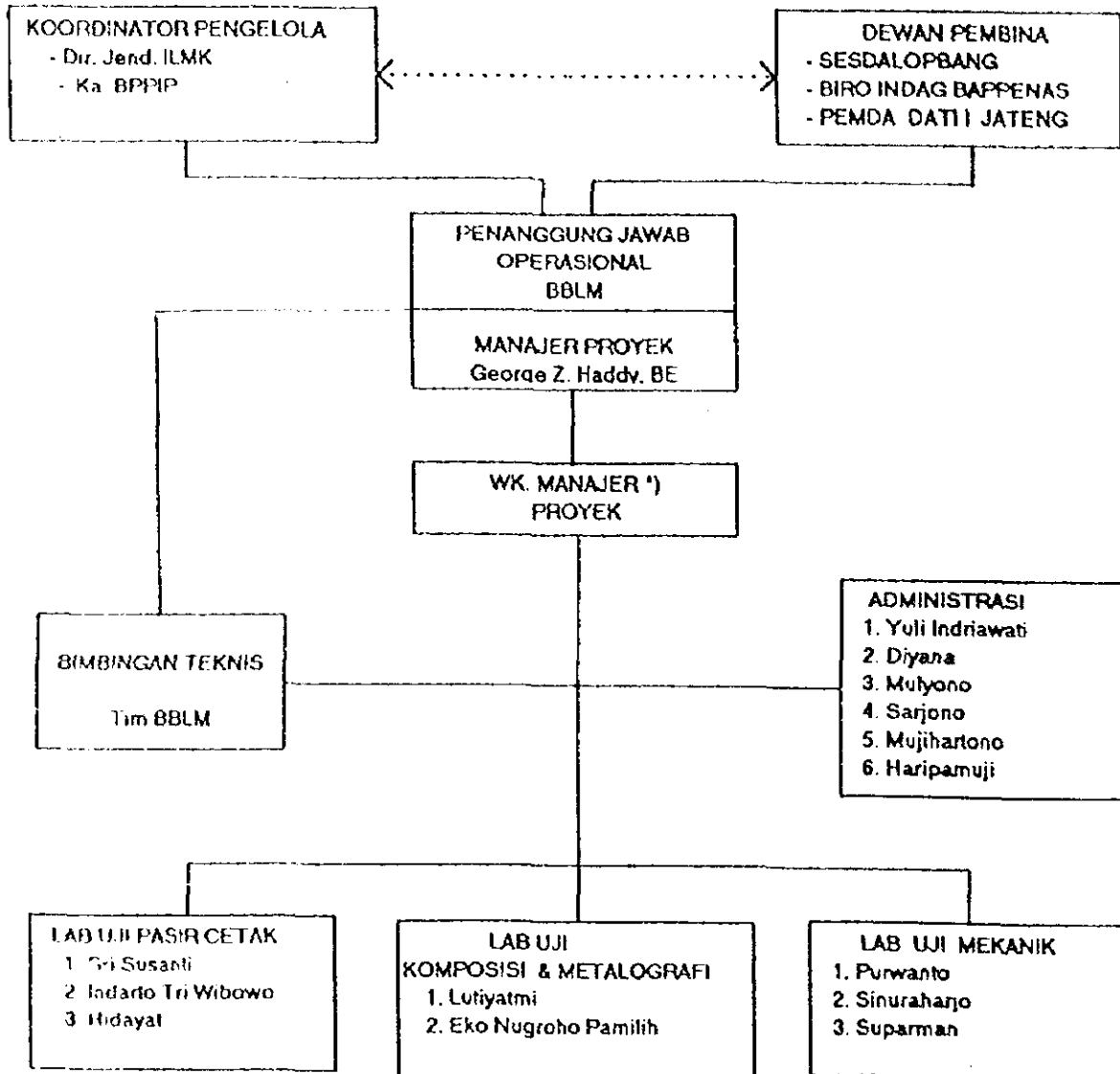
- Casting product that has not been manufactured by the domestic casting industries can be made upon request.

UNIT TEKNOLOGI PENGEMBANGAN INDUSTRI LOGAM DAN ALUMINIA



(1) 組織図

ORGANISASI
LABORATORIUM UJI LOGAM CEPER



*) Akan direkrut tenaga profesional non PNS



(2) スタッフリスト

Lampiran Surat Keputusan
Kepala Balai Besar Pengembangan
Industri Logam dan Mesin
Nomor : /Kpts/BBLM/IV/1997
Tanggal : 2 April 1997

No	N A M A	JABATAN
1.	George Zainal Haddy, BE	Manager
2.	Yuli Indriawati	Staf Administrasi
3.	Sri Susanti	Teknisi Lab.
4.	Eko Nugroho Pamilih	Teknisi Lab.
5.	Hidayat Yulianto	Teknisi Lab.
6.	Lutiyatmi	Teknisi Lab.
7.	R.Indarto Tri Wibowo	Teknisi Lab.
8.	Purwanto	Teknisi Lab.
9.	Sinung Rahardjo	Teknisi Lab.
10.	Suparman	Teknisi Lab.
11.	Mulyono	Teknisi Lab
12.	Yoga Samodra	Teknisi Lab
13.	Sarjono	Satpam
14.	Djiana	Satpam
15.	Muji Hartono	Pengemudi
16.	Hari Pamuji	Pramubakti

KEPALA BALAI BESAR
PENGEMBANGAN INDUSTRI LOGAM DAN MESIN



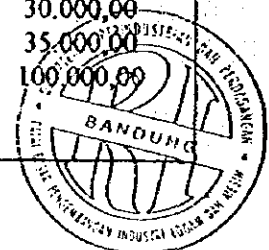
W. ENDANG DAHLAN
NIP 090007415

I. TARIF PENGUJIAN LOGAM

LAMPIRAN - I

(3) 受託試験価格表

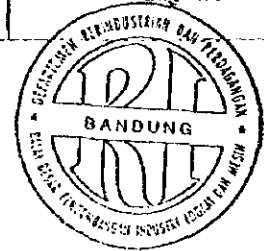
INDUSTRI LOGAM DAN MESIN			
NO.	KRITERIA UJI	METODE ANALISIS	TARIF (RP.)
	Analisa Kimia Spectro 18 Unsur	Spectrometer	100.000,00
II	Metalografi : 1. Mikrostruktur 2. Foto Mikrostruktur	SII SII	100.000,00 15.000,00
III	Pengujian Mekanik : 1. Kekerasan (HB,HRC,HV) 2. Kekuatan Tarik 3. Kekuatan Lengkung 4. Kekerasan Micro 5. Uji Impak 6. Kelelahan Unsur Putar	SII SII SII SII SII SII	20.000,00 50.000,00 50.000,00 30.000,00 30.000,00 20.000,00
IV	Pengujian Tidak Merusak : 1. X-Ray 2. Ultrasonic 3. Dye Penetrant 4. Magnetic Partikel	SII SII SII SII	50.000,00 40.000,00 15.000,00 15.000,00
V	Pengujian Pasir : 1. Berat Sampel (gr) 2. Kerapatan Massa (gr/cm ³) 3. Kekuatan Alir Gas 4. Kekuatan Padat (N/cm ²) 5. Kekuatan Tekan (N/cm ²) 6. Kekuatan Geser (N/cm ²) 7. Kekuatan Tarik (N/cm ²) 8. Kekuatan Bengkok (N/cm ²) 9. Kekuatan Retak (N/cm ²)	SII SII SII SII SII SII SII SII SII	4.500,00 6.500,00 6.500,00 6.500,00 6.500,00 6.500,00 6.500,00 6.500,00 6.500,00
VI	10. Butiran Pasir : - Luas Permukaan (cm ² /gr) - Jumlah Butiran (cm ² /gr) - Besar Butiran Rata-rata (cm ² /gr) - AFS No.	SII	10.000,00
VII	11. Bentuk Butiran 12. Titik Siter (oC) 13. Kadar Debu (%) 14. Bagian Hilang Terbakar (%) 15. Kandungan Air (%)	SII SII SII SII SII	3.500,00 20.000,00 12.000,00 15.000,00 5.000,00
VIII	16. Kandungan SIO ₂ (%) 17. Bentonit Aktif (%) 18. Derajat Keasaman (pH) (%) 19. Otimalisasi Campuran (%)	SII SII SII SII	50.000,00 30.000,00 35.000,00 100.000,00



(4) 保有機材リスト

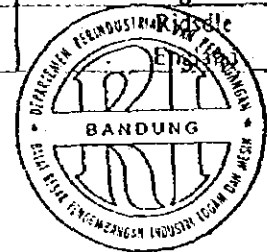
PROYEK BANTUAN PRESIDEN
LABORATORIUM UJI LOGAM DAN MINI FOUNDRY - CEPER

NO.	Nama Mesin / Peralatan	Qty	Spesifikasi	Merek/Negara Asal
B	PERALATAN UJI PASIR CETAK			
1.	Laboratory Mill	1 Unit	4 kg	Risidle England
2.	Sand Rammer	1 Unit	Standard Lab	Risidle England
	Flaminga Blok	1 Unit	Standard Lab	Risidle England
	Tensile Panning Accessory	1 Unit	Standard Lab	Risidle England
	Transverse Core Strenght Accessory	1 Unit	Standard Lab	Risidle England
	Moisture Indicator	1 Unit	Standard Lab	Risidle England
	Universal Sand Strenght Machine	1 Unit	Standard Lab	Risidle England
	Tensile Core Strenght Accessory	1 Unit	Standard Lab	Risidle England
	Transverse Core Strenght Accessory	1 Unit	Standard Lab	Risidle England
3.	Proctor Perimeter	1 Unit	Standard Lab	Risidle England

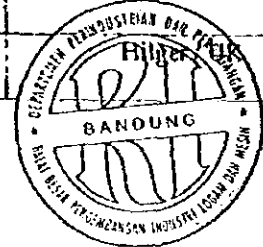


NO.	Nama Mesin / Peralatan	Qty	Spesifikasi	Merek/Negara Asal
5	Moisture Teller	1 Unit	Infra Red	Ridsdle England
	Moistbalance	1 Unit	Standard Lab	Ridsdle England
6	Mechanical Sieve Shaker	1 Unit	Standard Lab	Ridsdle England
	AFS to ASTM E11, 57, 8"	1 Unit	Standard Lab	Ridsdle England
7	Green Hardness Tester B Scale	1 Unit	Standard Lab	Ridsdle England
	Green Hardness Tester C Scale	1 Unit	Standard Lab	Ridsdle England
8	pH Meter Model Piccolo Plus	1 Unit	Standard Lab	Ridsdle England
9	Methylene Blue Clay Tester	1 Unit	Standard Lab	Ridsdle England
10	Flowability Indicator	1 Unit	Standard Lab	Ridsdle England
11	Rapid Sand Washer	1 Unit	Standard Lab	Ridsdle England
12	Compactability Tester	1 Unit	Standard Lab	Ridsdle England
13	Sliding Weight Scales	1 Unit	Standard Lab	Ridsdle England

4



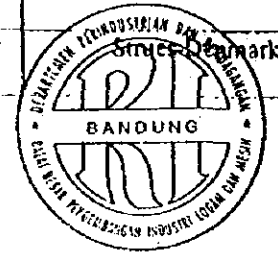
NO.	Nama Mesin / Peralatan	Qty	Spesifikasi	Merek/Negara Asal
14.	Sinter Furnace	1 Unit	STF 16:50	Ridsle England
15	Nikon Model SMZ 1 BF	1 Unit	Trinocular	Nikon / Japan
TOTAL UNTUK PERALATAN UJI PASIR CETAK				
C. PERALATAN KONTROL PROSES				
1.	Immersion Pyrometer	2 Unit	600 - 1750 deg Celsius	Northen Instrument / England
2.	CE Meter & Nodularity Detector Quick Lab II (P/N IR 24700118)	2 Unit	Digital Readout, Printer	Quick Lab / Belgium
3.	Radian Digital Pyrometer (Portable Infrared Pyrometer)	4 Unit	600 - 2000 deg Celsius	Mikron / USA
TOTAL UNTUK PERALATAN KONTROL PROSES				
D. PERALATAN LAB. UJI LOGAM				
<i>a. Komposisi Kimia Logam</i>				
1.	C & S Universal Determinator	1 Unit	C=4,5 S=0.24	Strohlein/USA
2.	Polyvac Optical Emission Spectrometer	1 Unit	E980 FE20	



1/10

NO.	Nama Mesin / Peralatan	Qty	Spesifikasi	Merek/Negara Asal
<i>b. Sifat Mekans Logam</i>				
1.	Universal Hardness Tester	1 Unit	270RS	AFFRI - Italy
2.	Hydraulic System Universal Testing Machine	1 Unit	50 T	Denison - UK
3.	Charpy System Impact Testing Machine	1 Unit	300 J	Denison - UK
<i>c. Mikro Structure Logam</i>				
1.	Universal, Metalurgical Research Microscope Microflex	1 Unit	X100S	Nikkon-Japan
		1 Unit	PEX35	Nikkon-Japan
2.	Cut of Machine Buehler Metallographic Sample Preparation	1 Unit	Minitom	Struers-Denmark
3.	Polishing Machine Accessories - Carimet disc 8 in - Microcloth 8 in - Micropolish Alumina #1 - Micropolish Alumina #2A - Micropolish Alumina # 3B - Micropolish Alumina # 1C	1 Unit	240mm	Struers-Denmark
4	Cold Mounting	1 Unit	Epovac	Struers-Denmark

1/2.



(5) 顧客・受託試験実績表

REKAPITULASI KEGIATAN PELAYANAN
LABORATORIUM PENGECORAN LOGAM CEPER - KLATEN
PERIODE JULI S/D 8 NOPEMBER 1997

No.	Nama Pemakai Jasa	Jenis Pengujian			Jumlah Sample	Catatan
			Masuk	Tanggal		
1	CV. Aneka Adhi Logam Karya Ceper-Klaten	- Komposisi kimia - Kekerasan - Kuat tarik	20-08-97	22-08-97	7	
2	CV. Aneka Adhi Logam Karya Ceper-Klaten	- Kekerasan - GFN pasir	24-08-97	1-09-97	6	
3	CV. Rumini Ceper-Klaten	- Kekerasan	25-08-97	1-09-97	1	
4	PT. Iokoh Ceperindo Klaten	- Kekerasan - Komposisi Kimia	25-08-97	01-09-97	5	
5	CV. Baja Kurnia Ceper-Klaten	- GFN - Clay Content - Dray Strength	26-08-97	28-08-97	1	
6	PT. Mitra Rekatama Mandiri Ceper-Klaten	- GFN - Clay Content - Green Strength	28-08-97	30-08-97	1	
7	Muncul Silika Ceper-Klaten	- GFN - Clay Content	28-08-97	16-09-97	1	
8	PT. Nimaru Kaldera Ceper-Klaten	- GFN - Clay Content - Green Strength	29-08-97	03-09-97	1	
9	PT. Iokoh Ceperindo Klaten	- Kuat Tarik - Kekerasan	30-09-97	03-09-97	6	
10	PT. Bininusa Bandung	- GFN - Clay Content - Green Strength - Komposisi Kimia	01-09-97	02-09-97	3	
11	PT. Metalica Bandung	- GFN - Clay Content - Green Strength	01-09-97	02-09-97	1	
12	PT. Kopo Metal Bandung	- GFN - Clay Content - Green Strength	01-09-97	02-09-97	1	
13	CV. Aneka Adhi Logam Karya Ceper - Klaten	- Komposisi Kimia	01-09-97	02-09-97	1	

No.	Nama Pemakai Jasa	Jenis Pengujian	Tanggal		Jumlah Sample	Catatan
			Masuk			
14.	CV. Suyuti Sido Majo Ceper - Klaten	- GFN - Clay Content - Green Strength	02-09-97	03-09-97	1	
15.	PT. Baja Kurnia Ceper - Klaten	- GFN - Clay Content - Green Strength	02-09-97	03-09-97	2	
16.	UD Gemilang Baja Ceper - Klaten	- Komposisi kimia	05-09-97	06-09-97	2	
17.	Krenekan Ceper - Klaten	- Komposisi kimia	11-09-97	12-09-97	1	
18.	Muncul Silika Ceper - Klaten	- GFN - Clay Content	15-09-97	17-09-97	1	
19.	CV. Sarana Teknik Ceper - Klaten	- Kekerasan - Metalografi - Komposisi kimia	22-09-97	22-09-97	4	
20.	PT. Itokoh Ceperindo Klaten	- Kekerasan	25-09-97	25-09-97	1	
21.	PT. Sinar Super Baja Ceper - Klaten	- Kekerasan - Metalografi - Komposisi kimia	26-09-97	26-09-97	2	
22.	PT. Sinar Super Baja Ceper - Klaten	- Kuat tarik	29-09-97	29-09-97	1	
23.	PT. Sinar Super Baja Ceper - Klaten	- Kuat tarik	30-09-97	30-09-97	1	
24.	CV. Bonjol Jaya Ceper - Klaten	- Kuat tarik	10-10-97	10-10-97	1	
25.	CV. Karya Hidup Sentosa Jogyakarta	- Kuat tarik - Komposisi kimia	16-10-97	16-10-97	1	
26.	CV. Sinar Super Baja Ceper Klaten	- Kekerasan	18-10-97	18-10-97	1	
27.	CV. Sinar Super Baja Ceper Klaten	- Kekerasan	30-10-97	30-10-97	1	
28.	CV. Sinar Super Baja Ceper Klaten	- Kekerasan	03-11-97	03-11-97	1	
29.	CV. Abadi Indah Ceper - Klaten	- Kekerasan	04-11-97	04-11-97	1	

No	Nama Pemakai Jasa	Jenis Pengujian	Masuk	Tanggal	Jumlah Sample	Catatan
30	PT. Itokoh Ceperindo Klaten	- GFN - Clay Content	05-11-97	06-11-97	2	
30 kali pelayanan		61 kali pengujian			63 buah sample	19 buah perusahaan

7 インドネシア国内誘導炉据付実績表



INDUCTOTHERM
(S.E. ASIA) PTY. LIMITED



Inductotherm (S.E. Asia) Pty. Limited
A.C.N. 008 351 468

62 Barco Avenue, Seaford, 3198
P.O. Box 171, Seaford, 3198
Victoria, Australia
Telex: AA33736
Fax: 1031 9735 3043
Telephone: (03) 9786 6000

INDONESIA
INSTALLATION LIST

<u>CUSTOMER</u>	<u>EQUIPMENT</u>	<u>USE</u>	<u>CAPACITY & FURNACE TYPE</u>
P.T. Barata Metalworks & Engineering Ltd. SURABAYA. INDONESIA.	250 kW VIP 1000 Mark IV	Holding Power Unit	(1) 500 kg hydraulic tilt Transite
P.T. Barata Metalworks & Engineering Ltd. SURABAYA. INDONESIA.	1000 kW VIP 4000 Mark IV	Steel	(2) 2000 kg steel shell
P.T. Djatin Utama Steel Works, SURABAYA. INDONESIA.	600 kW VIP Power-Trak	Steel	(1) 1000 kg steel shell (1) 2000 kg steel shell
Loka Metal JAKARTA. INDONESIA.	1000 kW 1000 Hz VIP Power-Trak	Iron	(2) 2000 kg steel shell
P.T. Inter Satria Perkasa JAKARTA. INDONESIA.	300 kW 1000 Hz VIP Power-Trak	Steel	(2) 500 kg hoist tilt Transite
CV. Logam Foundry MEDAN. INDONESIA	200 kW Tri-Line	Iron	(1) 750 kg hydraulic tilt Transite
C.V. Logam Foundry MEDAN. INDONESIA.	450 kW 1000 Hz VIP Power-Trak	Iron	(2) 750 kg hydraulic tilt Transite
C.V. Rimba Raya MEDAN. INDONESIA.	450 kW 1000 Hz VIP Power-Trak	Iron Steel	(2) 750 kg hydraulic tilt Transite



INDUCTOTHERM

- 2 -

**INSTALLATION LIST
INDONESIA**

CUSTOMER	EQUIPMENT	USE	CAPACITY & FURNACE TYPE
Perbengkelan Bakli JAKARTA, INDONESIA.	500 kW 1000 Hz VIP Power-Trak	Iron	(1) 1000 kg hydraulic tilt Transite
Mineral Technology Development Centre (P.P.T.M.) BANDUNG, INDONESIA	30 kW 9600 Hz VIP Power-Trak	R. & D.	(2) 25 kg hoist tilt
Bengkel Utama UJUNG PANDANG, INDONESIA	200 kW 1000 Hz VIP Power-Trak	Steel	(2) 300 kg hoist tilt Transite
P.T. Hydraxle Perkasa JAKARTA, INDONESIA	300 kW 1000 Hz VIP Power-Trak	Steel	(2) 500 kg hydraulic tilt Transite
P.T. Maju Warna Steel SURABAYA, INDONESIA	750 kW 1000 Hz VIP Power-Trak	Steel	(1) 1000 kg steel shell (1) 2000 kg steel shell
P.T. Djaja Baru Agung JAKARTA, INDONESIA	750 kW 1000 Hz VIP Power-Trak	Iron	(2) 1000 kg hydraulic tilt Transite
Mustang Teknik JAKARTA, INDONESIA	300 kW 1000 Hz VIP Power-Trak	Iron	(1) 500 kg hoist tilt Transite (1) 1000 kg hoist tilt Transite
LIN-LIPI, CISITU (P.T. Geo Supply) BANDUNG, INDONESIA	30 kW 9600 Hz VIP Power-Trak	Iron	(1) 25 kg hand tilt

<u>CUSTOMER</u>	<u>EQUIPMENT</u>	<u>USE</u>	<u>CAPACITY & FURNACE TYPE</u>
P.T. Bina Usaha Mandiri JAKARTA, INDONESIA	500 kW 500 Hz VIP Power-Trak	Iron	(1) 1000 kg hydraulic tilt Transite
P.T. Bina Usaha Mandiri JAKARTA, INDONESIA	500 kW 500 Hz VIP Power-Trak	Iron	((1) 1000 kg hydraulic tilt Transite
CV. Bumi Brakedrum MALANG, INDONESIA	300 kW 1000 Hz VIP Power-Trak	Iron	(2) 500 kg hydraulic tilt Transite
P.T. Alexindo JAKARTA, INDONESIA	300 kW 1000 Hz Power-Trak	Alum. Bronze	(2) 500 kg hydraulic tilt Transite
P.T. Parama Raya JAKARTA, INDONESIA	300 kW 1000 Hz VIP Power-Trak	Bronze	(2) 500 kg hydraulic tilt Transite
CV. Bina Technika BANDUNG, INDONESIA	Existing		(1) 25 kg table furnace
P.T. Pindad (Persero) BANDUNG, INDONESIA	1250 kW 500 Hz PI VIP Power-Trak	Steel	(2) 2000 kg hydraulic tilt Dura-Line furnaces
P.T. Indo Bangna Prima JAKARTA, INDONESIA	300 kW 1000 Hz VIP Power-Trak	Iron Steel	(1) 2000 kg hydraulic tilt Transite (1) 500 kg hydraulic tilt Transite



<u>CUSTOMER</u>	<u>EQUIPMENT</u>	<u>USE</u>	<u>CAPACITY & FURNACE TYPE</u>
P.T. Metalina Tunggal SURABAYA, INDONESIA	400 kW 1000 Hz VIP Power-Trak	Bronze Steel	(1) 1000 kg hydraulic tilt Dura-Line (1) 500 kg hydraulic tilt Dura-Line
P.T. (Persero) Aneka Tambang JAKARTA, INDONESIA	50 kW 10000 Hz VIP Power-Trak	Gold	(1) 6 station manual push out
P.T. (Persero) Aneka Tambang JAKARTA, INDONESIA	20 kW 10000 Hz VIP Power-Trak	Gold	(1) 20 kg hydraulic tilt Transite
CV. Bumi Brakedrum MALANG, INDONESIA	2x300 kW 1000 Hz VIP Power-Trak	Iron Steel Stainless Steel	(2) 500 kg hydraulic tilt Transite
P.T. Alexindo JAKARTA, INDONESIA	Existing 300 kW Power-Trak	Alum.	(1) 500 kg aluminium capacity Transite
P.T. Agrindo SURABAYA, INDONESIA	750 kW 500 Hz VIP PI Power-Trak	Iron	(2) 1000 kg steel shell furnaces
Mustang Teknik JAKARTA, INDONESIA	1000 kW 500 Hz VIP PI Power-Trak	Steel	(1) 2000 kg steel shell furnace
P.T. Barata Metalworks SURABAYA, INDONESIA	VIP 4000 1000 Hz Mark IV	Steel	Existing (1) 2000 kg steel shell furnace

<u>CUSTOMER</u>	<u>EQUIPMENT</u>	<u>USE</u>	<u>CAPACITY & FURNACE TYPE</u>
Indonesian Institute of Sciences (LIPI) BANDUNG, INDONESIA	200 kW 1000 Hz VIP Power-Trak	Iron	(1) 350 kg hoist tilt Dura-Line furnace
Politeknik Mekanik Swiss BANDUNG, INDONESIA	200 kW 1000 Hz VIP Power-Trak	Iron	(2) 200 kg hydraulic tilt Dura-Line furnaces
P.T. Dinatama Rekanusa JAKARTA, INDONESIA	500 kW 1000 Hz VIP Power-Trak	Steel	(2) 1000 kg steel shell furnaces
P.T. Prima Alloy Steel SURABAYA, INDONESIA	2x450 kW 1000 Hz VIP Power-Traks	Alum	(3) 750 kg hyd. tilt steel shell furnaces
P.T. Hanco Foundry Industry BANDUNG, INDONESIA	500 kW 500 Hz VIP Power-Trak	Iron	(2) 1000 kg steel shell furnaces
P.T. Texmaco Perkasa Ehg. SEMARANG, INDONESIA	750 kW 500 Hz VIP Power-Trak	Iron	(2) 1000 kg steel shell furnaces
P.T. Baja Persada Mull Perkasa TANGERANG, INDONESIA	600 kW 1000 Hz VIP Power-Trak	Steel Iron	(1) 1000 kg hydraulic tilt Dura-Line furnace
P.T. Bakrie Tosanjaya JAKARTA, INDONESIA	1250 kW 500 Hz VIP P.I. Power-Trak	Iron	(2) 2000 kg steel shell furnaces



<u>CUSTOMER</u>	<u>EQUIPMENT</u>	<u>USE</u>	<u>CAPACITY & FURNACE TYPE</u>
P.T. Pupuk Kaltim (GEMCO) BONTANG, INDONESIA	500 kW 1000 Hz VIP Power-Trak	Iron Steel	(2) 750 kg hydraulic tilt Dura-Line Furnaces
P.T. Asenda Baja Pratama BANDAR LAMPUNG, INDONESIA	750 kW 500 Hz VIP Power-Trak	Iron Steel	(1) 1000 kg steel shell (1) 2000 kg steel shell Furnaces
CV. Bumi Brakedrum MALANG, INDONESIA	2x300 kW 1000 Hz VIP Power-Traks	Iron	(2) 500 kg hydraulic tilt Dura-Line furnaces
P.T. Merak Megah Steel SURABAYA, INDONESIA	600 kW 1000 Hz VIP Power-Trak	Iron Steel	(2) 1000 kg hydraulic tilt Dura-Line Furnaces
P.T. Gunanusa Utama Fabricators JAKARTA, INDONESIA	1000 kW 500 Hz VIP Power-Trak	Iron	(1) 2000 kg steel shell furnace
C.V. Bumi Brakedrum MALANG, INDONESIA	300 kW 1000 Hz VIP Power-Trak	Iron	(1) 500 kg hydraulic tilt Dura-Line furnace
P.T. Himalaya Everest Jaya JAKARTA, INDONESIA	300 kW 1000 Hz VIP Power-Trak	Iron Steel	(2) 500 kg hydraulic tilt Dura-Line furnaces
P.T. Texmco Perkasa SEMARANG, INDONESIA	750 kW 500 Hz VIP Power-Trak	Iron	(2) 1000 kg steel shell furnaces

<u>CUSTOMER</u>	<u>EQUIPMENT</u>	<u>USE</u>	<u>CAPACITY & FURNACE TYPE</u>
P.T. Parama Raya JAKARTA, INDONESIA	300 kW 1000 Hz VIP Power-Trak	Brass	Exstling (1) 500 kg hydraulic tilt Transite furnace
P.T. Bara Multi Metalika BANDUNG, INDONESIA	300 kW 1000 Hz VIP Power-Trak	Iron Steel	(2) 500 kg hydraulic tilt Dura-Line furnaces
P.T. Hanil Jaya SURABAYA, INDONESIA	450 kW 1000 Hz VIP Power-Trak	Iron Steel	(2) 750 kg hydraulic tilt Dura-Line furnaces
P.T. Hanil Jaya SURABAYA, INDONESIA	125 kW 3000 Hz VIP Power-Trak	Steel	(2) 100 kg hydraulic tilt Dura-Line furnaces
P.T. Budi Prima Baja Tanggung JAKARTA, INDONESIA	1000 kW 500 Hz VIP Power-Trak	Iron	(2) 2000 kg steel shell furnaces
P.T. Texmaco Perkasa Engineering SEMARANG, INDONESIA	175 kW 3000 Hz VIP Power-Trak	Steel	(1) 200 kg hyd tilt Dura-Line furnace
P.T. Bani Nusa Indonesia BANDUNG, INDONESIA	500 kW 500 Hz VIP Power-Trak	Iron	(2) 1000 kg hydraulic tilt Dura-Line furnaces
P.T. San Yang Metal Industry JAKARTA, INDONESIA	1000 kW 500 Hz VIP PI Power-Trak	Iron	(2) 1600 kg steel shell furnaces

<u>CUSTOMER</u>	<u>EQUIPMENT</u>	<u>USE</u>	<u>CAPACITY & FURNACE TYPE</u>
P.T. Pipa Mas Putih BATAM, INDONESIA	200 kW 1000 Hz VIP Power-Trak	Steel	(2) 250 kg hydraulic tilt Dura-Line furnaces
Indonesian Institute of Sciences (LIPI) (P. T. Stimec Elcom) JAKARTA, INDONESIA	350 kW 1000 Hz VIP Power-Trak	Steel	(2) 500 kg hydraulic tilt Dura-Line furnaces
Mustang Tehnik JAKARTA, INDONESIA	Existing 1000 kW 500 Hz VIP PI Power-Trak	Steel	(1) 4000 kg steel shell furnace
P.T. Star Impactama Indah JAKARTA, INDONESIA	350 kW 500 Hz VIP Power-Trak	Copper	(2) 1000 kg hydraulic tilt Dura-Line furnaces
P.T. Komatsu Indonesia JAKARTA, INDONESIA	1800 kW 500 Hz VIP PI R Power-Trak	Steel	(2) 3000 kg steel shell furnaces
Logam Perusahaan Perbengkelan MEDAN, INDONESIA	Existing	Iron	(1) 1000 kg hydraulic tilt Dura-Line furnace
C.V. Sinar Super Baja KLATEN, INDONESIA	200 kW 1000 Hz VIP Power-Trak	Iron	(1) 250 kg hydraulic tilt Dura-Line furnace
Indonesian Institute of Sciences (LIPI) (P.T. Capital Mutual Corporation) BANDUNG, INDONESIA	125 kW 1000 Hz VIP Power-Trak	Iron & Steel	(2) 200 kg hydraulic tilt Dura-Line furnaces



<u>CUSTOMER</u>	<u>EQUIPMENT</u>	<u>USE</u>	<u>CAPACITY & FURNACE TYPE</u>
North Sumatra Islamic Unversly (Sintokoglo Ltd) MEDAN, INDONESIA	30 kW 9600 Hz VIP Power-Trak	Iron & Steel	(1) 25 kg hoist tilt box furnace
Trisakti Unversity JAKARTA, INDONESIA	50 kW 3000 Hz VIP Power-Trak	Steel	(1) 50 kg hoist tilt box furnace
P.T. Pupuk Kaltim (Persero) BONTANG, INDONESIA	1750 kW 500 Hz VIP PI R Power-Trak	Iron	(1) 3000 kg steel shell furnace
P.T. Aneka Karya KLATEN, INDONESIA	500 kW 500 Hz VIP Power-Trak	Iron	(2) 1000 kg steel shell furnaces
P.T. Salira Perkasa SURABAYA, INDONESIA	300 kW 1000 Hz VIP Power-Trak	Steel	(2) 300 kg hydraulic tilt Dura-Line furnaces
CV. Sinar Super Baja KLATEN, INDONESIA	Existing	Iron	(1) 500 kg hydraulic tilt Dura-Line furnace
P.T. San Yang Metal Industry JAKARTA, INDONESIA	1250 kW 500 Hz VIP R Series Dual-Trak	Iron	Existing
P.T. Komatsu Indonesia JAKARTA, INDONESIA	1800 kW 500 Hz VIP PI R Series Power-Trak	Steel	Existing 3000 kg steel shell furnaces

<u>CUSTOMER</u>	<u>EQUIPMENT</u>	<u>USE</u>	<u>CAPACITY & FURNACE TYPE</u>
P.T. Sumbermitra Sarijaya JAKARTA, INDONESIA	1500 kW 500 Hz VIP PI R Series Power-Trak	Iron Steel	(1) 2000 kg hydraulic tilt Dura-Line furnace (1) 3000 kg hydraulic tilt Dura-Line furnace
P.T. Asama Indonesia Manufacturing KARAWANG, INDONESIA	1750 kW 400 Hz VIP PI R Series Dual-Trak	Iron	(2) 2000 kg steel shell furnaces
P.T. Merak Megah Steel SURABAYA, INDONESIA	Existing 600 kW 1000 Hz VIP Power-Trak	Steel	(1) 2000 kg hydraulic tilt Dura-Line furnace
CV. Bakti JAKARTA, INDONESIA	550 kW 500 Hz VIP R Power-Trak	Iron	Existing 1000 kg Transite furnace
P.T. Aple Indokarunia SURABAYA, INDONESIA	600 kW 500 Hz VIP R Power-Trak	Steel	(2) 1000 kg hydraulic tilt Dura-Line furnaces
P.T. Bajapersada Muliperkasa JAKARTA, INDONESIA	Existing 600 kW 1000 Hz VIP Power-Trak	Steel	(1) 1000 kg hydraulic tilt Dura-Line furnace
P.T. Himalaya Nabeya JAKARTA, INDONESIA	750 kW 300 Hz VIP PI R Dual-Trak	Iron	(2) 1000 kg hydraulic tilt Dura-Line furnaces

CUSTOMER	EQUIPMENT	USE	CAPACITY & FURNACE TYPE
P.T. Bakrie Tosanjaya BEKASI, INDONESIA	2500 kW 300 Hz VIP PI R Power-Trak	Iron	(1) 4000 kg Steel Shell furnace
P.T. Bakrie Tosanjaya BEKASI, INDONESIA	2500 kW 300 Hz VIP PI R Power-Trak	Iron	(1) 4000 kg Steel Shell furnace
P.T. Bakrie Tosanjaya BEKASI, INDONESIA	2500 kW 300 Hz VIP PI R Power-Trak	Iron	(1) 4000 kg Steel Shell furnace
P.T. Growth Asla (Foundry Division) MEDAN, INDONESIA	600 kW 500 Hz VIP R Power-Trak	Steel	(2) 1000 kg hydraulic tilt Dura-Line furnaces
P.T. Sumbermitra Sarijaya JAKARTA, INDONESIA	1500 kW 500 Hz VIP PI R Series Dual-Trak	Iron	(2) 2000 kg hydraulic tilt Dura-Line furnaces
Universitas Indonesia (Phillip Harris) JAKARTA, INDONESIA	50 kW 3000 Hz VIP Power-Trak	Steel	(1) 50 kg hoist tilt box furnace
Universitas Indonesia (Phillip Harris) JAKARTA, INDONESIA	15 kW 9600 Hz VIP Power-Trak	Steel	(1) 15 kg hand tilt box furnace
P.T. Sumber Karya Bakti Persada JAKARTA, INDONESIA	850 kW 200 Hz VIP PI R Power-Trak	Brass	(1) 3000 kg Steel Shell furnace

<u>CUSTOMER</u>	<u>EQUIPMENT</u>	<u>USE</u>	<u>CAPACITY & FURNACE TYPE</u>
P.T. Ebara Indonesia CIMANGGIS-BOGOR, INDONESIA	500 kW 200 Hz VIP PI R Power-Trak	Iron	(1) 2000 kg Steel Shell furnace (holding)
P.T. Sinar Industri KLATEN, INDONESIA	300 kW 1000 Hz VIP R Series Power-Trak	Iron	(2) 500 kg hydraulic tilt Dura-Line furnaces
Perbengkelan Bakti JAKARTA, INDONESIA	Existing 550 kW 500 Hz VIP R Series Power-Trak	Iron	(1) 1000 kg hydraulic tilt Dura-Line furnace
P.T. Aneka Tambang (Persero) JAKARTA, INDONESIA	Existing 75 kW 3000 Hz VIP R Series Power-Trak	Gold	(1) 150 kg gold capacity hydraulic tilt Dura-Line furnace
A Certain Company JAKARTA, INDONESIA	350 kW 1000 Hz VIP R Series Power-Trak	Steel	(2) 500 kg hydraulic tilt Dura-Line furnaces

Technical Qualification Sheet (3)

3	溶解	MELTING	
3-1	キューポラ操業	Cupola Operation	
3-1-1	投入材料のgoods別配合計算ができるか	Ability to calculate charge mixture	
3-1-2	副材料の使用目的を知っているか	Knowledge of purpose of additional material	
3-1-3	操業に必要な項目の単位を知っているか (送風圧力、送風量、コークス比、溶解温度、出湯温度など)	Knowledge of various conditions required for operation (blast pressure, blast volume, coke ratio, melting temperature, tapping)	
3-1-4	炉前接種とは	Knowledge of inoculation treatment at furnace front	
3-1-5	副材料の使用目的	Knowledge of purpose of additional material (Fe-Si, Fe-Mn, Fe-Cu, Fe-Mo, Cu, Ni, etc.)	
3-2	高周波誘導炉溶解	High Frequency Induction Furnace Melting	
3-2-1	炉修の方法と材料	Knowledge of procedure of and material for repairing of furnace	
3-2-2	操業 (通電、材料投入順序、保熱通電)	Knowledge of operation (power supply, charging order, power supply for heat preservation)	
3-2-3	炉前試験 (楔試験、CEチェック、チルテスト等)	Knowledge of tests at furnace front (wedge type test, CE check, Chill test, etc.)	
3-2-4	取鍋の補修と予熱	Knowledge of repairing and preheating of pouring ladle	
3-2-5	球状黒鉛鑄鉄、CV鑄鉄の処理 (脱硫、接種等)	Knowledge of treatment of ductile iron and C.V. graphite iron (desulphurization, inoculation, etc.)	
3-2-6	溶解温度	Knowledge of melting temperature	
3-2-7	溶滓処理	Knowledge of treatment of slag	

9 本報告書で用いた略語・為替レート

略語

ADB	Asian Development Bank	アジア開発銀行
AWP	Annual Work Plan	年次活動計画
BAPPENAS	National Development Planning Board	国家開発企画庁
BPPIP	Agency for Research and Development of Industry and Trade	工業商業省研究開発庁
C/P	Counterpart Personnel	カウンターパート
FC	Gray Cast Iron	ねずみ鉄
FCD	Ductile Cast Iron	球状黒鉛鉄
IRDMMI	Institute for Research and Development of Metal and Machinery Industries	金属機械工業研究所
ISEC	Industrial Services Engineering Center	
ITHR	Industrial Technology and Human Resources Development	
ITIT	Institute for Transfer of Industrial Technology	国際産業技術研究事業
JODC	Japan Overseas Development Cooperation	海外貿易開発協会
MIDC	Metal Industries Development Center	金属機械工業研究所
MOIT	Ministry of Industry and Trade	工業商業省
NIRIN	National Industrial Research Institute of Nagoya	名古屋工業技術研究所
PDM	Project Design Matrix	プロジェクト・デザイン・マトリックス
R/D	Record of Discussions	討議議事録
Rp	Indonesian Rupiah	インドネシア・ルピア
TCP	Technical Cooperation Program	技術協力計画
TSI	Tentative Schedule of Implementation	暫定実施計画

為替レート

1 Rp=0.036円

1 US\$=3,490Rp

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