

# DIVISION OF WELDING

# I. MACHINERY & EQUIPMENT DEVELOPMENT FOR WELDING DIVISION

EXISTING				DEVELOPMENT PROGRAM			
No.	Machine & Equipment	Qty	Year	No.	Machine & Equipment	Qty	Year
1.	SMAW - Machines	10 units	1969	1.	SMAW Machines	20 units	1997
2.	GTAW - Machines	2 units	1969	2.	GMAW Machines	3 units	1997
3.	GMAW - Machines	2 units	1969	3.	GTAW Machine	1 unit	1997
4.	SAW - Machines	2 units	1969	4.	Polishing Machine	1 unit	1997
5.	Plate Roll Machines	2 units	1969	5.	Burner for Plat Cutting	2 unit	1997
6.	Bending Machines	2 units	1969	6.	Burner for Pipe Cutting	2 unit	1997
7.	Nibling Machine	1 unit	1969	7.	SAW Machine	1 unit	1997
8.	Plate Shearing Machines	1 unit	1969	8.	Plasma Spray	1 unit	1997
9.	Portal Presting Machine	1 unit	1969	9.	Plasma Welding	1 unit	1997
10	Boring Machine	1 unit	1969	10	Spinning Machine	1 unit	1997
11.	Spot Welding Machine	1 unit	1969	11.	Cutting Machine	1 unit	1997
12.	ESW Machines	2 units	1969	12.	Continous Welding Machine	1 unit	1997
13.	Miller Welding Machine	1 unit	1969	13.	Welding Speed Control	1 unit	1997
14.	Tensile Strength Machine	1 unit	1969	14.	Automatic Welding Recorder	1 unit	1997
15	X - Ray Machine	1 unit	1969	15	Gas Mixer Controller	1 unit	1997
16:	Impact Machine	1 unit	1969	16.	Heating Element	1 unit	1997
17.	Hardness Tester	2 units	1969	17.	Extruder Stick Electrode Marker	1 unit	1997

## II. HUMAN RESOURCES DEVELOPMENT

EXISTING		DEVELOPMENT PROGRAM							
No.	Qualification	Qty	No.	Qualification	98/99	99/00	00/01	Total	
1.	S3	-	1.	S3 Metallurgy	1	-	1	2	
2.	S2	-	2.	S2 Metallurgy	1	1	1	3	
3.	S1 Mechanical	1	3.	S1 Mechanical	2	2	2	6	
4.	S1 Metallurgy	-	4.	S1 Metallurgy	1	1	1	3	
5.	D3 Electro	-	5.	D3 Electro	1	1	-	2	
6.	D3 Industrial	-	6.	D3 Industrial	1	1	-	2	
7.	D3 Metallurgy	1	7.	D3 Metallurgy	-	1	1	2	
8.	Technical High School	10	8.	Technical High School	4	4	4	12	
9.	Senior High School	2	9.	Senior High School	1	1	1	3	
10	Junior High School	2	10	Junior High School	-	1	-	1	

### III. SERVICES ACTIVITY

No.	EXISTING	VALUE	No.	DEVELOPMENT PROGRAM (2003)	VALUE (Projection)
1.	Training of Welder Qualification	250.000.000	1.	Training of Welder Qualification	1.200.000.000
2.	Training of Welding Supervisor	60.000.000	2.	Training of Welding Supervisor	1.000.000.000
3.	Training of Weiding Repair	80.000.000	3.	Training of Welding Repair	400.000.000
4.	Supervision of Welding	70.000.000	4.	Supervisor or Welding	350.000.000
5.	Fabrication of Steel Construction	120.000.000	5.	Fabrication of Steel Contruction	1.500.000.000
6.	Welding of Components	20.000.000	6.	Welding of Components	50.000.000
		600.000.000			4.500.000.000

# DIVISION TESTING & CALIBRATION

#### 4. MACHINERY AND EQUIPMENT FOR CALIBRATION & TESTING DEVELOPMENT

EXISTING				DEVELOPMENT PROGRAMME			
No.	Machinery & Equipment	Qty	Year	No.	Machinery & Equipment	Qty	Year
1.	Calibration			1.	Calibration		
a.	Length Standard - Gauge Block Class 1 - Laser Interferometer - Profile Projection	1 set 1 set 1 set	1994 1994 1994	a.	Length Standard - Gauge Block Class 00, Long Block	1 set	1998
b.	Temperature Standard - Thermocouple - Furnance - Temperature Calibration	1 set 1 set 1 set	1994 1994 1994	b.	Temperature Standard - Temperature Calibration	1 set	1998
c.	Force Standard - Lord Cell 2 - 50 ton - Rockwell Hardness Block	1 set 1 set	1994 1994	c.	Force Standard - Lord Cell 50 - 100 ton - Lord Cell 0 - 2 ton	1 set 1 set	1998 1998
d.	Pressure Standard - Dead Weight - Test Gauge	1 set 1 set	1994 1994	d.	Pressure Standard - Vacuum Test Gauge	1 set	1998
				e.	Mass Standard	1 set	1998
				f.	Electrical Standard	1 set	1998

## II. HUMAN RESOURCES DEVELOPMENT

EXISTING			DEVELOPMENT PROGRAMME						
No.	Qualification	Qty	No.	Qualification	Qty	97/98	98/99	99/00	00/01
1.	Calibration - S1 Mechanical Engineer - Technical High School	4 2	1.	Calibration - S1 Mechanical Engineer - D3 Mechanical - Technical High School	1 1 2	1 - -	- 1 -	- - 2	- - -
2.	Testing - S1 Mechanical Engineer - Technical High School	1 2		Testing - S1 Mechanical Engineer - D3 Mechanical - Technical High School	2 1 1	- 1 1	1 - -	1 - -	- - -
3.	Technical Administration - S1- LAN - Senior High School	1 2		Technical Administration - S1 LAN - Senior High School	- 2	- 2	- -	- -	- -
4.	Management Laboratorium - S1 Mechanical Engineer - Senoir High School	2 1		Management Laboratrium - S1 Mechanical Engineer - D3 Mechanical - Technical High School	2 2 2	- - -	- 2 2	1 - -	1 - -
5.	Maintenance Laboratorium	-		Maintenance Laboratorium - D3 Mechanical - D3 Electrical/Electronic - Technical High School	1 1 2	- - -	1 1 2	- - -	- - -

### III. SERVICES ACTIVITY

No.	EXISTING	VALUE	No.	DEVELOPMENT PROGRAMME (2003)	VALUE (Projection)
1.	Training - Calibration - Industrial Metrology & QC	10,000,000 5,000,000	1.	Training - Calibration - Industrial Metrology & QC, 20 person	50,000,000 20,000,000
2.	Calibration	50,000,000	2.	Calibration, 1000 unit	60,000,000
3.	Field Calibration	30,000,000	3.	Field Calibration, 50 unit	50,000,000
4.	Product Testing	1,000,000	4.	Product Testing, 50 unit	2,500,000
5.	Field Testing	1,000,000	5.	Field Testing, 25 unit	25,000,000
6.	Performance Test	3,000,000	6.	Performance Test, 25 unit	12,500,000
		100,000,000			220,000,000



# DIVISION OF MACHINING

### 3. MACHINERY & EQUIPMENT DEVELOPMENT FOR MACHINERY DIVISION

EXISTING				DEVELOPMENT PROGRAMME			
No.	Machinery & Equipment	Qty	Year	No.	Machinery & Equipment	Qty	Year
1.	Lathe Machines	7 units	1969	1.	CNC Turning Machine	1 unit	1997
2.	Milling Machines	9 units	1969	2.	CNC Milling Machine	1 unit	1997
3.	Boring Machines	6 units	1969	3.	CNC Horizontal Machine Centre (5 axes)	1 unit	1997
4.	Grinding Machines	5 units	1969	4.	CNC Copy Milling	1 unit	1997
5.	Planer Machine	2 units	1969	5.	CNC Coordinat Measuring Machine	1 unit	1997
6.	EDM Machines	2 units	1969	6.	EDM CNC Machine	1 unit	1997
7.	Tool Sharpening	4 units	1969	7.	CNC Wire Cut EDM Machine	1 unit	1997
8.	Measuring Equipments	-	1969	8.	Cutting Tools	1 set	1997
9.	Maintenance Equipments	-	1969	9.	CNC Profile Grinding	1 unit	1997
				10.	Dies Supporting	1 unit	1997
				11.	Ultra Sonic Polysbing Machine	1 unit	1997

## II. HUMAN RESOURCES DEVELOPMENT

EXISTING			DEVELOPMENT PROGRAMME					Total
No.	Qualification	Qty	No.	Qualification	98/99	99/00	00/01	
1.	S3	-	1.	S3 Mech. Engineer	-	-	1	1
2.	S2	-	2.	S2 Mech. Engineer	-	-	1	1
3.	S1 Mechanical Engineer	1	3.	S1 Mech. Engineer	2	2	2	6
	S1 Industrial Engineer	1		S1. Industrial Engineer	1	1	1	3
4.	D3 Mech. Engineer	-	4.	D3 Mech. Engineer	3	2	2	7
5.	Technical High School	19		D3 Industrial Engineer	1	1	1	3
6.	Senior High School	2	5.	Technical High School	7	10	12	29
7.	Junior High School	1						
		24						50

### III. SERVICES ACTIVITY

No.	EXISTING	VALUE	No.	DEVELOPMENT PROGRAM (2003)	VALUE (Projection)
1.	Training of General Machining	50,000,000	1.	Training of Precession Machining	500,000,000
2.	Training of Maintenance	20,000,000	2.	Training of Tools & Dies	550,000,000
3.	Training of Tools & Dies	50,000,000	3.	Training of CNC Machine Tool (operator)	960,000,000
4.	Applied R&D of Components	150,000,000	4.	Training of CNC Machine (programmer)	250,000,000
5.	Applied R&D of Tool & Dies	150,000,000	5.	Supervision of Precession Machining	500,000,000
6.	Sharpening of Cutting Tools	10,000,000	6.	Supervision of Tools & Dies	500,000,000
7.	Repair of Machining	20,000,000	7.	Applied R&D of Component	750,000,000
8.	Supervision of General Machine Tool	50,000,000	8.	Applied R&D of Tools & Dies	175,000,000
		500,000,000			4,185,000,000

## I.A. CAD/CAM TRAINING / APPLICATION LAB

EXISTING		DEVELOPMENT PROGRAMME					
No.	Machinery & Equipment	Qty	Year	No.	Machinery & Equipment	Qty	Year
				1.	PC - Based Hardware	25 unit	1997/98
				2.	A0 Plotter	1 unit	1997/98
				3.	Overhead Slide Projector	1 unit	1997/98
				4.	Data Switch	1 unit	1997/98
				5.	A3 Inkjet Colour Printer	5 unit	1997/98
				6.	Large Scale Projection System	1 unit	1997/98
				7.	Computer Projection Panel	1 unit	1997/98
				8.	Screen	1 unit	1997/98
				9.	Furniture	1 set	1997/98
				10.	CAD Software	25 set	1997/98
				11.	Video Network	25 set	1997/98
				12.	Teachware	1 unit	1997/98

# I.B. PC - BASED CNC SIMULATION LAB

EXISTING			DEVELOPMENT PROGRAMME				
No.	Machinery & Equipment	Qty	Year	No.	Machinery & Equipment	Qty	Year
				1.	PC Hardware	21 unit	1997/98
				2.	Multifunction Keyboard	21 unit	1997/98
				3.	Overleaf Foil For Each Control; - Heidenhain TNC 426 - FANUC OM - SIEMENS 8406 - TRAUB TX8F - FANUC OT	21 unit	1997/98
				4.	Software for above with DXF Interface	21 set	1997/98
				5.	Video Net Working	1 set	1997/98
				6.	Data Switch	1 unit	1997/98
				7.	Over Head Slide Projector	1 unit	1997/98
				8.	A3 Inkjet Colour Printer	1 unit	1997/98
				9.	Large Scale Projection System	1 unit	1997/98
				10.	Computer Projection System	1 unit	1997/98
				11.	Screen	1 unit	1997/98
				12.	Furniture	1 unit	1997/98
				13.	Teachware	1 set	1997/98
				14.	CNC Milling With Above Control Function	1 unit	1997/98
				15.	CNC Lathe With Above Control Function	1 unit	1997/98

Machinery / Equipment	Quant	Manufacture / Specification
SURFACE GRINDER	1	LIP (France) capacity — 800×230 with magnetic table wheel $\phi$ — 250 face — 25
SURFACE GRINDER	1	Jones Shipman (UK) Type — 540 capacity — 700×200 with magnetic table wheel $\phi$ — 150 face — 15
SURFACE GRINDER	1	WAASDIJK (Belgium) capacity — 1000×440 with magnetic table wheel $\phi$ — 240 face — 50
CENTERLESS GRINDING MACHINE	1	MOUVEMENT HYDRAULIQUE SISTEMA IDAULICO 1200 × $\phi$ 250
VERTICAL MILLER	1	WAASDIJK (Belgium) MI800 capacity — 1000×500 table(T-slots) arbor — $\phi$ 25 vertical travel — 600 throat — 300
COPY MILLER (MANUAL)	1	DECKEL travel — 400 vert swing — 200 table — 500 × 500
UNIVERSAL MILLER	1	ACIERA (German) table — 400×250 overarm reach — 130 spindle — $\phi$ 20max tool size with dividing head centre also full accessories for angular milling

LATHE	1	DECKEL FP1
LATHE	1	PEHAKA COMPASS
DRILLING MACHINE	1	Est. G. TAILLET (Belgium)
JIG BORER	1	CIF Society Genouior (Switzerland) MP-5E spindre — NO2 Morse Taper
CRANK PRESS	1	S. A. MECATEC N. V MACHINES-OUTILS QUTILLAGS (Belgium) eccentric capacity — 80T Daylight — 300 Die-set (sample : dies made in MIDC)

<Die tools made in MIDC>

ex : Electric Power Transmission Component (Tension Arm)

Blanking Die - Frame of a pair of Glasses



付属資料3. MIDCで過去4年間実施された研修

Attachment 3

DAFTAR JASA PELAYANAN TEKNIS  
BALAI BESAR PENGEMBANGAN INDUSTRI LOGAM DAN MESIN  
TAHUN ANGGARAN 1992/1993

NO	BIDANG UPT	P E M E S A N	NILAI (Rp)	KETERANGAN
A.	Rancang Bangun : <i>(Assignment)</i> 1. Pembuatan pempe tongan	PT. Amerto Karya	9.525.000,-	(9.525.000,-) R&D
B.	Diklat : <i>(TRAINING)</i> 1. Diklat las Bitung - Palembang 2. Diklat las 3. Diklat las SMAW 4. Diklat las TIC 5. Diklat supervisi las 6. Diklat teknologi pengeelasan bejana tekan tingkat supervisor 7. Diklat pengeelasan alat berat kendaraan bermotor 8. Diklat teknologi pengeelasan untuk supervisor 9. Diklat las perawat 10. Training singkat las TIC & MIG 11. Diklat kualifikasi Juru las 12. Training las di BBLM 13. Diklat pengeelasan 14. Diklat supervisi las 15. Praktak penekukan las 16. Diklat teknologi pengeelasan ferro 17. Kursus las TIC & MIG 18. Diklat las titanium 19. Pelatihan tenaga teknis 20. Diklat las titanium 21. Diklat las 4 orang 22. Diklat pengeelasan 23. Diklat AutoCAD	PT. Esobindo Pratomo Y D B A PT. Semen Padang PT. Indah Kiat Pulp. PT. Semen Padang I M L D E I M L D E I M L D E PT. Esobindo Pratomo Irida PT. Pinded PT. Esobindo PT. Bukit Ason B4T BIPK Sumber PT. Hendo Federal PT. Garuda Indonesia Kamwil Perind. Rabon PT. Bodok Bentang PT. Garuda Indonesia PT. Petro Kimia Gresik Peserta dari industri	3.247.200,- 7.500.000,- 10.300.000,- 5.588.000,- 5.000.000,- 59.070.000,- 68.070.000,- 43.510.000,- 3.247.200,- 2.409.000,- 2.310.000,- 3.000.000,- 3.200.000,- 1.400.000,- 1.200.000,- 6.680.000,- 2.125.000,- 3.316.000,- 800.000,- 4.000.000,- 5.616.000,- 3.490.200,- 1.350.000,-	<i>(Training)</i>
C.	Supervisi : <i>(SUPERVISION)</i> 1. Supervisor kepastian mutu dalam fabrikasi beton tekan & alat penukar panas.	PT. Puspertino	14.190.000,-	14.190.000,- VES.

NO	BIDANG UPT	P E M E S A N	NILAI (Rp)	KETERANGAN
✓	2. Supervisi bejana tekan & alat penukar panas	PT. Puspertino	15.510.000,-	
✓	3. Supervisi bidang manajemen fabrikasi	PT. Wijaya Karya	76.500.000,-	
✓	4. Supervisi bidang pemessinan	PT. Tjokro Putro	6.500.000,-	
✓	5. Supervisi bidang perbengkelan	PT. Koltim Diptorosa	62.530.000,-	Addendum
✓	6. Supervisi alat penukar panas	PT. Puspertino	13.530.000,-	Addendum
✓	7. Supervisi bidang pemessinan & fabrikasi	PT. Tjokro Putro Persada	2.250.000,-	Addendum
✓	8. Supervisi bidang pemessinan	PT. Wijaya Karya	95.007.500,-	
✓	9. Pengembangan teknologi proses pengelasan logam dan perlakuan panas	PT. Tjokro Putro Persada PT. Mestantina	4.500.000,- 6.050.000,-	
✓	10. Supervisi bidang pengecoran di Banjarmasin	PT. Pupuk Kaltim	5.170.000,-	
✓	12. Supervisi bidang fabrikasi dan manajemen di Kemayoran	PT. Jowo Steel	2.640.000,-	Tambahan
✓	13. Supervisi fabrikasi dan manajemen di Pariten	PT. Jowo Steel	40.365.000,-	Tambahan
✓	14. Pembuatan pompa tangan	UNICEF	2.500.000,-	(347.752.500,-)
✓	15. Kalibrasi : (CALIBRATION)	PT. Brun NGL & Co. PT. Agrindo	742.000,- 550.000,-	(1.292.000,-)
✓	16. Pembuatan produk/komponen : (PRODUCT MANUFACTURING)	PT. IPTN Bandung	15.000,-	
✓	17. Blead air tubuh pesawat L-100/ PK MS	PT. Alpha Rustenite PT. Alpha Rustenite	186.000,- 385.000,-	
✓	18. Pemessinan metal sopping kanan	PT. Budi Steel	48.000,-	
✓	19. Pemessinan move block body	PD. Makmur Sentosa	139.000,-	
✓	20. Pengerosan cam noise, slash ball	CV. Diantoko	71.500,-	
✓	21. Pengerosan cam tabiat	PT. Simu Presindo	53.500,-	
✓	22. Finishing lubang torok	PT. Dahana	1.119.000,-	
✓	23. Grinding meja	PD. Makro	45.000,-	
✓	24. Pengelasan stainless steel	PD. Makmur Sentosa	1.214.000,-	
✓	25. Hardening shaft berulir	PT. Bukoko Teknik	848.000,-	
✓	26. Pengerosan blister tablet			
✓	27. Surviving jaw			

NO	SILOANG UPT	P E M E S I N N	NILAI (Rp)	KETERANGAN
12.	Stone crusher	CV. Sirlika Foundry	40.000,-	
13.	Komponen tekstil	CV. Pronto Jowo	100.000,-	
14.	Pengeceoran dan temple bowl kerucut	CV. Bud. Steel	27.500,-	
15.	Pembuatan rotaring dan ukuran $\phi$ 500 x 500 x 1,5	CV. Sutroco	100.000,-	
16.	Roll kayu	CV. Libro Teknik	105.000,-	
17.	Pembuatan kampuh las	CV. Widarto	24.500,-	
18.	Sose plate mould	PT. Alkoru	52.000,-	
19.	Machining cetakan kelas	Hone Industri	185.000,-	
20.	Paros torak	PT. Semeru	211.000,-	
21.	Rangka cetak	industri aluminium	35.000,-	
22.	Pembuatan semprotan air	Asap Rochmat	500.000,-	
23.	Pemotongan pelat	PT. Prediko	50.000,-	
24.	Pembuatan bok air dari pelat	Pribadi	40.000,-	
25.	Komponen tekstil	PT. Bisma	100.000,-	
26.	Hardening matras	PT. RA Jowo Santoso	38.000,-	
27.	Sealing tablet	PD. Mokmur Santoso	625.000,-	
28.	Pengerjaan checking mandrel	PT. Iapir	778.200,-	
29.	Pengerjaan lubang pisau	CV. Margio Jowo	180.000,-	
30.	Pengerjaan roda gigi	CV. Kosih Satrio	49.000,-	
31.	Pengerjaan grinding poros	CV. Budi Steel	40.000,-	
32.	Hardening guide pin	PT. Alkoru	32.500,-	
33.	Tempering pisau	PT. Doyo Sudhono	21.500,-	
34.	Pengerjaan dukungan roll	CV. Achrafano	120.000,-	
35.	Hardening besi cor	PT. Metro	26.000,-	
36.	Hardening roda gigi	CV. Kosih Satrio	28.000,-	
37.	Pengeceoran dia & punch	PD. Mokmur Santoso	150.000,-	
38.	Pengeceoran sudut	F.L.M	250.000,-	
39.	Perbaikan die & punch	PD. Mokmur Santoso	300.000,-	
40.	Pengelasan beam	CV. Bintang Permana	25.000,-	
41.	Aging Al	PT. Metro	37.500,-	
42.	Hardening poros	PT. Bisma	21.500,-	
43.	Pengeceoran induksi poros bergigi	CV. Tiga Saudoro	20.000,-	
44.	Komponen tekstil	CV. Metode	120.000,-	
45.	Hardening	PT. Metro	32.500,-	
46.	Pengeceoran pengecepan air	PT. Celico	32.500,-	
47.	Pengeceoran cam dan roda gigi	PT. Metro	75.000,-	
48.	Roll kayu	Libro Teknik		

NO	BIDANG UPT DIKLAT	P E M E S A N	NILAI (Rp)	KETERANGAN
49.	Pengerjaan diir T	CV. Ade Plastik	200.000,-	
50.	Sliding L 45	Siliako Foundry	40.000,-	
51.	Pengerosan roda gigi	PT. Metro	32.000,-	
52.	Komponen tekstil	PT. Metro	70.000,-	
53.	Komponen tekstil	PT. Pronoto Jaya	120.000,-	
54.	Stress relieving	PT. Pronoto Jaya	32.000,-	
55.	Plot dudukan meter	PT. Wijaya Karya	270.000,-	
56.	Stress relieving cast	PT. Pronoto Jaya	39.000,-	
57.	Pengerjaan grinding poros	PT. Budi Steel	40.000,-	
58.	Pengerjaan grinding poros	Yogi Sopotro	10.500,-	
59.	Pengerosan induksi poros	CV. Tiga Saudara	22.500,-	
60.	Komponen tekstil	PT. Cipto Nusa	50.000,-	
61.	Komponen shot blast	PT. Logam Jaya	650,-	
62.	Pengerosan induksi poros ber- uair	PD. Metro	25.000,-	
63.	Pengerjaan rak aluminium	Bopak Ong	10.500,-	
64.	Rali kayu	Libro Teknik	30.000,-	
65.	Pengerosan shaft	RTMI Surakarta	250.000,-	
66.	Pengerjaan alat ekstrusi	PT. Moeso	150.000,-	
67.	Pembuatan proses cast	PD. Makmur Sentosa	300.000,-	
68.	Grinding pin	CV. Berkot Bumi Boru	40.000,-	
69.	Komponen rumah blower	Toto Sudarto	300.000,-	
70.	Pengerjaan aluminium block	PT. Daya Sudhono Bakti	78.000,-	
71.	Pembuatan clamp tower FCD	Logam Jaya	30.000,-	
72.	Pengerosan os gear	CV. Tiga Saudara	30.000,-	(10.796.380,-)

Rp 638.805.480,-

DAFTAR JASA PELAYANAN TEKNIS  
BALAI BESAR PENGEMBANGAN INDUSTRI LOGAM DAN MESIN  
TAHUN ANGGARAN 1993/1994

NO	BIDANG JPT	PEMESAN	NILAI (Rp)	KETERANGAN
1	2	3	4	5
A	LITBANG TEKNOLOGI	(RLO)		
	PROSES			
1	Grinding pen	Berkat Bumi Baru	375.000	
2	Pengelasan aluminium		60.000	
3	Pemanasan suhu 850C	PT Matra	25.000	
4	Pembuatan pelat pengungkit	PT Purna Sadana	900.000	
5	Pengerasan pisau bayonet	PT Sadhana Bakti	30.000	
6	Pengerasan dies	PT Altinek	21.500	
7	Pengerasan dies tablet	PT Altinek	16.500	
8	Pengasahan pisau	PT Celco	72.000	
9	Pengasahan pisau	PT Presisi Utama	30.000	
10	Pengelasan rak	PT Celco	90.000	
11	Pembuatan komponen tekstil	PT Indra	110.000	
12	Pembuatan pisau plastik	Bengkel Pasundan	120.000	
13	Pelapisan metal dengan timah	PT Fajar Metalindo Abadi	80.000	
14	Pengerjaan orifis	PT Pertamina	300.000	
15	Pengelasan rak	Koong	500.000	
16	Hardening pin	PT Alkaru	33.000	
17	Grinding pen	Berkat Bumi Baru	210.000	
18	Pengerasan gear	CV Tiga Saudara	26.000	
19	Pengerasan pisau	PT Daya Sadhana	21.500	
20	Komponen tekstil	PT Diantika	40.000	
21	Komponen die	CV Inti Karet	150.000	
22	Poros untuk sliding	PT Jaya Utama	65.000	
23	Pembuatan grinding plate	PT Makmur Sento-sa	75.000	
24	Travering system	PT IPTN	975.000	
25	Pembuatan busing	PT Makmur Sento-sa	125.000	
26	Grinding plate	PT Presisi Utama	150.000	
27	Pengerasan roda gigi	PT Alkaru	15.000	
28	Pembuatan cacat las terkendali	BATAM/ATOM	3.052.500	
29	Pengerjaan orifis	PT Pertamina	150.000	
30	Pembuatan spesimen uji tarik	CV Sipra Jaya	200.000	

1	2	3	4	5
31	Heat treatment as roda gigi	CV Mekar Logam	43.000	
32	Pembuatan komponen tekstil	PT Pranata Jaya	100.000	
33	Grinding rata blok pisau	CV Alisanto	187.000	
34	E.D.M.	CV Adia Tama	50.000	
35	Pengerasan bushing	PT MBT	43.000	
36	Pembuatan model piston	Nusantara Tehnik	100.000	
37	Membentuk radius	PT Yersey Indonesia	50.000	
38	Studi limbah elektro	Bapedal	28.500.000	→ p. 20
39	Servis plat bergerigi grinding	PT Pindani Tehnik	120.500	
40	Pembuatan komponen tekstil	PT Indra	40.000	
41	Pembuatan komponen tekstil	PT Pranata Jaya	60.000	
42	Pembuatan piston	PT Nusantara Tehnik	200.000	
43	Komponen Holand dental	PT Holand Dental	325.000	
44	Grinding rata plat bergerigi	PT Pindani Tehnik	360.000	
45	Pengersan pisau bayonet	PT Sadhana Bakti	64.500	
46	Pengerasan poros	PT Matra	32.500	
47	Pekerjaan grinding roda putar bergigi	PT Pindani Tehnik	218.000	
48	Pengerasan roda gigi	PT Bisma	86.000	
49	Alat panrik kabel	Bengkel Agung	60.000	
50	Engine adaptor	CV Slamet	5.000.000	
51	Orifis	PT Karya Abadi	75.000	
52	Pembuatan clam pipa	IPTN	200.000	
53	Grinding pisau	PT Pindani Tehnik	32.000	
54	Pemegang pisau	Bengkel Bubut Bubut	32.000	
55	Grinding pisau	PT Celco	40.000	
56	Pembuatan komponen tekstil @ 1,5 kg	PT Indra	60.000	
57	Pembuatan komponen tekstil @ 2 kg	PT Libra Tehnik	40.000	
58	Pembuatan roda gigi	CV Alisanto	150.000	
59	Pengelasan jaring kawat	PT Celco B.Abadi	100.000	
60	Grinding plat	PT Adhi Karya	60.000	
61	Pembuatan pisau gunting	PT Makmur	60.000	
62	Hardening rol	PT Presisi Utama	43.000	

1	2	3	4	5
63	Pembuatan starter air turbine	PT Rekatama Putra	150.000	
64	Pembuatan roda gigi lurus	CV Alisanto	150.000	
65	E D M	Bengkel Tehnik	75.000	
66	Pengelasan panel listrik	ITB	100.000	
67	Pengelasan sudu turbine	PLN Bandung	1.000.000	
68	Penyerut kabel	Bengkel Agung	200.000	
69	Pengerasan roda gigi lurus	PT Yogi Saputra	43.000	
70	Pengelasan pelat happer	CV Hati	50.000	
71	Pengerasan roda gigi	PT setra Tehnik	21.500	
72	Bubut & drilling poros	PT Wijaya Karya	200.000	
73	Pekerjaan orifis sebanyak 2 unit	Pertamina Unit eksplorasi Cireb.	100.000	
74	Pembuatan komponen tekstil 30 buah	Pranata Jaya	102.000	
75	Pembuatan manifold	PLN	280.000	
76	Pengerasan wire plat	CV Dian Tehnik	40.000	
77	Pengerasan wire plat	CV Dian Tehnik	52.000	
78	Grinding plate	PT Presisi KU	26.000	
79	Pembuatan model kayu untuk manifold	PT Libra Tehnik	108.000	
80	Pekerjaan EDM	Home industry	130.000	
81	Pekerjaan aluminium	Makmur Sentosa	40.000	
82	Pekerjaan EDM	PT Pasundan T	156.000	
83	Komponen mesin	CV Alisanto	127.000	
84	Pengelasan dinding boiling	PT Langgeng K	100.000	
85	Penelitian pelapisan keras dengan nikel crom	PT Krakatau Steel	21.164.000	R&D
86	Grinding poros	PT Aldimek	15.000	
87	Grinding poros	Bengkel Tehnik	40.000	
88	Pembuatan bak kincir air	Tasikmalaya/Taraju	100.000	
89	Pengerasan roda gigi	PT Bisma	43.000	
90	Pengerasan as gear	PT Dua Saudara	32.000	
				69.193.500,-
B.	RANCANG BANGUN DAN REKAYASA INDUSTRI	(DESIGN AND INDUSTRIAL ENGINEERING)		
91	Pembuatan dies kapul	PT Makmur Sentosa	3.240.000	
92	Pembuatan Braille	Wiyata Guna	1.500.000	

1	2	3	4	5
93	Riset terpadu pembuatan baja tahan karat	LIFI	115.000.000	(R & D)
94	Informasi industri	UIIK/YDBA	4.800.000	
95	Pembuatan Braille Printer	Wiyata Guna	300.000	
96	Dies tablet	PT Makmur Sentosa	240.000	
97	Pembuatan Braille	Wiyata Guna	825.000	
98	Dies tablet	PT Makmur Sentosa	240.000	
99	Dies tablet seelling	PT Makmur Sentosa	120.000	
100	Pembuatan alat uji tarik	TSG (Engineering Project)	80.000	
101	Pembuatan Braille	Wiyata Guna	750.000	
102	Cetakan telepon	Home Industry	275.000	
103	Pembuatan matres alat pembolong	PT MBT	40.000	
104	Pekerjaan dies kapsul	PT Makmur Sentosa	2.600.000	
105	Desain dan supervisi pembuatan mesin filament winding	PT Graha S. Fortuna	5.060.000	(R & D)
				135.070.000
	C PENGUJIAN, STANDARDISASI DAN KALIBRASI	( TESTING , STANDARDIZATION AND CALIBRATION )		
106	Pengukuran cavity	PT Dian Surya Global	250.000	
107	Pengukuran dan perbaikan orifis	PT Arun NGL & Co	742.000	
108	Uji tarik	ITB	15.000	
109	Rekondisi mesin crank shaft grinding	Bengkel Putri	1.544.400	
110	Kalibrasi alat ukur	PT Matra	60.000	
111	Pengujian dan pembuatan foto struktur mikro logal	Technical Service Group	225.000	
112	Kalibrasi profil proyektor	PT Indotrojaya	670.000	
113	Kalibrasi gauge blok	PT Merlin G	246.000	
114	Uji tarik plat dan pipa	PT Prominator	260.000	
115	Pengujian tarik untuk besi cor	CV Sipro Jaya L	200.000	
116	Pengujian tarik untuk besi cor	CV Sipro Jaya L	200.000	
				4.412.400,-



1	2	3	4	5
	D. DIKLAT (TRAINING):			
117	Training las tita- nium	PT Indah Kiat	1.815.000	
118	Diklat las perawatan tahap II Batu Raja	PT Esabindo Pra- tama	3.696.000	
119	Diklat las dan ilmu bahan	YDBA	9.352.000	
120	Diklat tool sharpen- ning	PT Semen Multi Company	6.103.350	
121	Diklat las perawatan tahap I gelombang II	PT Esabindo Pra- tama	3.696.000	
122	Praktek kerja	UNWIM	1.372.000	
123	Training pattern	AASMI - Medan	2.376.000	
124	Pendidikan dan latih- an metrologi indus- tri	IWPL	64.200.000	
125	Pengetesan juru las	PT Timah	8.975.000	
126	Kualifikasi juru las	PT Kaltim dan PT Kaltim, PT Gunung Madu	24.500.000	
127	Peragaan pengelasan aluminium	B4T	8.701.000	
128	Praktek diklat indus- tri sepeda	B4T	7.600.000	
129	Pelatihan Nisa II	PT Barata	11.570.000	
130	Praktek kerja maha- siswa	UNWIM	2.808.000	
131	Diklat las	PT Esabindo	671.000	
132	Pendidikan dan kualifi- kasi	PT Timah	39.201.000	
				196.637.150
	E. JASA KONSULTANSI DAN SUPERVISI	(CONSULTATION AND SUPERVISION)		
133	Supervisi fabrikasi alat penukar panas	PT Puspetindo	15.400.000	
134	Supervisi perbeng- kelan	PT Kaltim Cipta Yasa	23.250.000	
135	Supervisi fabrikasi - Proyek control - Planning control	PT Puspetindo	23.000.000	
136	Supervisi GC, gambar & mould	UNICEF	4.200.000	
137	Supervisi manajemen dan fabrikasi	PT Wika	114.000.000	
138	Supervisi enjiniring	PT Puspetindo	16.060.000	

Diklat

1	2	3	4	5
139	Supervisi dan pelatihan di Indolift	PT Indolift	1.800.000	
140	Supervisi fabrikasi	PT Fuspelindo	29.436.000	
141	Supervisi las 2 (dua) orang	PT Jaya Steel	3.000.000	
142	Supervisi fabrikasi	PT Jaya Steel	5.200.000	
143	Supervisi pengendalian mutu dan perancangan pembuatan dies untuk pengecoran aluminium	PT Castech	12.810.000	
Jumlah seluruhnya			683.469.050	

**DAFTAR JASA PELAYANAN TEKNIS  
BALAI BESAR PENGEMBANGAN INDUSTRI LOGAM DAN MESIN  
TAHUN ANGGARAN 1994/1995**

*Lampiran 2.*

No.	BIDANG JASA	PEMESINAN	NILAI
1	2	3	4
<b>A</b>	<b>LITBANG TERAPAN (R&amp;D)</b>		
1	Pembuatan baja tahan karat cor dan penerapannya di industri	LIPI <i>P-2D</i>	226.000.000
2	Penelitian pelapisan Black Chrom pada logam Aluminium	PT WIJAYA KARYA <i>P-2D</i>	6.062.000
3	Studi pendataan industri cor dan pemesinan di Bandung dan sekitarnya	PT BUMI PRASIDI <i>P-2D</i>	7.800.000
4	Analisa kegagalan bagian rangka bogie yang di las	PT INKA <i>P-2D</i>	2.541.000
			242.403.000
<b>B</b>	<b>RANCANG BANGUN &amp; PEREKAYASAAN PRODUK</b>	<i>(DESIGN &amp; PRODUCT ENGINEERING)</i>	
1	Design and quality control	UNICEF	6.330.000
2	Improvement on out line & modification on detail	UNICEF	8.118.000
3	Design manufacture for FRP mould testing	PROJECT PAPB	3.658.000
			18.106.000
<b>C</b>	<b>PENDIDIKAN DAN PELATHAN (TRAINING)</b>		
1	Diklat las dan perawatan di Semen Padang dan PIP Bitung	PT ESABINDO	7.392.000
2	Diklat rehabilitasi mesin perkakas	PT PURA REKAYASA	4.983.000
3	Diklat las dan cor	YDBA	13.200.000
4	Diklat las	PT TIMAH	39.197.800
5	Diklat design dan pemesinan	BALAI BANJARBARU	3.200.000
6	Training AutoCAD	PT PUSPETINDO & CV MULTI MINERAL	1.500.000

1	2	3	4
7	Training bidang pemesinan	PIM	6.804.000
8	Praktek las welding engineering	B4T	412.000
9	Diklat Jig & Fixture	IWPL	73.500.000
10	Diklat las GMAW	DESCONA JASA	2.970.000
11	Supervisi diklat las	UNITED TRACTOR	31.324.300
12	Diklat las GTAW	TEPAT GUNA	5.341.600
13	Praktikum naslap	POLITEKNIK I.N	1.188.000
14	Diklat pengecoran logam dasar	PT ARSIMELIN	66.897.900
15	Training CAD/CAM	PT KRAMAYUDHA / PT PUSPETINDO	600.000
16	Training las TIG	PT GARUDA	5.269.000
17	Diklat pemesinan	KANWIL MALUKU	696.250
18	Training transport data computer & CNC	BANINUSA	1.200.000
19	Training Dbase AutoCAD	PUSPETINDO / PUPUK KALTIM	6.250.000
20	Diklat las	PUSBINLAT	24.980.000
21	Praktek pelapisan dan pengujian mekanik	POLITEKNIK INDUSTRI DAN NIAGA	2.100.000
22	Training NISA II Software	PUSPETINDO/PUPUK KALTIM	9.000.000
23	Diklat las	PT LEN	14.788.800
24	Training AutoCAD	PERUM PERURI	1.500.000
25	Bimbingan juru las	EDI SUSANTO	480.000
			324.774.650
<b>D</b>	<b>KONSULTASI DAN SUPERVISI (CONSULTATION &amp; SUPERVISION)</b>		
1	Supervisi engineering bejana tekan dan alat penukar panas	PT PUSPETINDO	15.950.000

1	2	3	4
2	Dapur annealing	PT MARUBENI, CO	85.000.000
3	Supervisi konstruksi baja peralatan pabrik	PT PUSPETINDO	41.811.500
4	Bantuan teknik cor dan mesin	PT ANEKA KARYA	5.445.000
5	Supervisi bidang manajemen dan fabrikasi	PT WIJAYA KARYA	165.600.000
6	Supervisi bidang pemesinan	PT SEMERU MC	8.800.000
7	Supervisi penggunaan mesin perkakas CAD/CAM	PLN DAYEUEH KOLOT	2.125.000
8	Supervisi of FRP	UNICEF	4.050.000
9	Supervisi las	PT TEPAT GUNA	2.400.000
10	Supervisi bidang pattern	PT PUPUK KALTIM	26.400.000
11	Supervisi bidang maintenance	PT PUPUK KALTIM	5.225.000
12	Supervisi bid. manajemen & Fabrikasi	PT WIJAYA KARYA	19.470.000
13	Bimbingan FCAW	PT DOK SURABAYA	4.125.000
14	Consulting service for engineering	DHV	228.462.000
15	Supervisi fabrikasi	PT WIJAYA KARYA	106.500.000
			721.363.500
<b>E</b>	<b>PEMBUATAN PRODUK &amp; KOMPONEN</b>	<i>(PRODUCT &amp; COMPONENTS MANUFACTURING)</i>	721.363.500
1	Sealing die	PT MAKMUR SENTOSA	80.000
2	Slang cetakan karet	PT INTI KARET	150.000
3	Komponen tekstil	CV DARA	100.000
4	Pengerolan selinder tabung	PT MUIN	100.000
5	Pisau potong	PT PRESISI WIRA M	80.000
6	Alat senjata	DISLITBANG AURI	200.000
7	Alat harmonisasi laser	DISLITBANG AURI	160.000
8	Perbaikan mesin boring dan milling	PT PUSRI	4.942.887

1	2	3	4
9	Perbaikan dan pengukuran ulang orifis	PT ARUN	750.000
10	Komponen alat Al	BENGKEL BUBUT	100.000
11	Blok tutup mesin dan bearing housing	PT PRESISI KARYA UT.	200.000
12	Komponen mould press	PT IKAD	100.000
13	Grinding pisau	PT ALISANTO	80.000
14	Pengerasan as roll	PT INDO EXTRUSION	54.000
15	Pembuatan tabung	PT CELCO	750.000
16	Alat bantu pemasangan paking karet	HOME INDUSTRY	100.000
17	Pekerjaan grinding plate cutter	PD PRESISI KU	115.000
18	Pengerasan packing bowl	CV SINAR TIMUR	21.500
19	Pengerasan sekop	PT TRIJAYA	21.500
20	Alat instruksi keramik	LIPI	180.000
21	Pembuatan komponen shot blast	CV ANEKA KARYA	163.200
22	Pengerjaan spart mesin rajut	BENGKEL MEKARJAYA	200.000
23	Pengerjaan komponen cetakan oring karet	CV INTI HAYAT	80.000
24	Pengerasan pisau tekuk	CV MEKAR JAYA	21.500
25	Pengerjaanudukan pisau	PT PASUNDAN	240.000
26	Grinding pin	PT PRSINDO	247.000
27	Pembuatan komponen tekstil	SILIKA FOUNDRY	18.000
28	Pengerjaan vorriching as grendel	HOME INDUSTRY	60.000
29	Pengerjaan sealing	MAKMUR SENTOSA	200.000
30	Pengerjaan beton dof	PT PENSILINDO	160.000
31	Pengerjaan as berukir	PT MATRA	161.000
32	Pengelasan box komponen	DODY	50.000
1	2	3	4

33	Copy milling cavity	PT TERATE	80.000
34	Pembuatan alur tepi	PT MEFROFORM	50.000
35	Pekerjaan poros penetran	PT MEDANTARA	140.000
36	Pengukuran kerataan permukaan	PT TRIGUNAWAN	50.000
37	Pekerjaan EDM	PT SAKA LOGAM	40.000
38	Pekerjaan EDM Cetakan	PASUNDAN TEKNIK	40.000
39	Sharpening liner die	MEDANTARA KENCAN	30.000
40	Pekerjaanudukan pisau	PASUNDAN TEKNIK	40.000
41	Pekerjaan grinding blok pisau	ALISANTO	95.000
42	Pekerjaan cavity plat	PASUNDAN TEKNIK	40.000
43	Pengerasan roda gigi	PT GEMA P. PLASTIK	32.000
44	Pengelasan relid valve housing	SULZER	10.650.000
45	Pengelasan tanki	PT CELCO	2.400.000
46	Pembuatan model komponen mesin	SILICA FOUNDRY	750.000
47	Pembuatan komponen tekstil	CV MATRA	40.000
48	Pembuatan komponen tekstil	PRANATA JAYA	60.000
49	Pengerasan baja piringan	PT. PRESISI KARYA U	32.000
50	Pekerjaan forming dari alumunium	PT MAKMUR SENTOSA	160.000
51	Pengerasan packing bowl	PT SINAR TIMUR	21.500
52	Pekerjaan grinding pin	PT MITRA	0
53	Praktikum mahasiswa	UNWIM	607.500
54	Pekerjaan brozching	HOME INDUSTRY	15.000
55	Pekerjaan pisau bergigi	PASUNDAN TEKNIK	400.000
56	EDM cavity die forging	SEMERU MULTI C	380.000

1	2	3	4
57	Dudukan engsel	BERDIKARI	100.000
58	Pembuatan alur	MAKMUR SENTOSA	80.000
59	Pengerasan klem karet	AZHAR TEKNIK	54.000
60	Pekerjaan pisau	MAKMUR SENTOSA	60.000
61	Perbaikan cutting dies	MAKMUR SENTOSA	60.000
62	Pekerjaan orifis	PERTAMINA	150.000
63	Pembuatan komponen tekstil	CV DIANTIKA	100.000
64	Pembuatan komponen	SULZER	2.587.000
65	Pekerjaan grinding pin	PASUNDAN TEKNIK	96.000
66	Pembuatan komponen tekstil	PRANATA JAYA	70.000
67	Pekerjaan plat pas	PASUNDAN TEKNIK	60.000
68	Pemeriksaan komposisi kimia	PT CERES	50.000
69	Pekerjaan komponen tabung	HOME INDUSTRY	40.000
70	Pekerjaan pisau potong	PT MAKMUR SENTOSA	80.000
71	Hardening roda gigi	SETIA TEKNIK	32.000
72	Pembuatan komponen tekstil	CV DIANTIKA	50.000
73	Komponen tekstil	CV DIANTIKA	40.000
74	Komponen tekstil	SILIKA FOUNDRY	80.000
75	Komponen tekstil	SILIKA FOUNDRY	60.000
76	Percobaan peningkatan kualitas	KRAKATAU STEEL	450.000
77	Pengerasan bowl	SINAR TIMUR	32.000
78	Pengerasan Bi conic	SPECTA TEKNIK	21.500
79	Pekerjaan surface multi	PLTA KAMOJANG	200.000
80	Pembuatan komponen	KARYA USAHA	40.000



1	2	3	4
81	Pengerasan 7 buah pisau	SUKARAJA	21.500
82	Pengerasan pipa 20 buah	MBT	43.000
83	Pengerasan Bi conic	SPECTRA	21.500
84	Pembuatan komponen traktor	SEMERU MULTI	1.440.000
85	Pengerasan pipa	PT MBT	43.000
86	Pekerjaan grinding pisau	PINDAD	60.000
87	Pekerjaan printer	ELEKTRONIK	50.000
88	Pekerjaan cetakan botol	INTI KARET	70.000
89	Pengerasanudukan	DIANTIKA TEKNIK	21.500
90	Pengerasan obeng	DUA SAUDARA	43.000
91	Pekerjaan alat pemotong	MAKMUR SENTOSA	80.000
92	Pekerjaan poros gigi	PASUNDAN TEKNIK	30.000
93	Pembuata angker mesin	PASUNDAN TEKNIK	100.000
94	Grinding pisau bergigi	PASUNDAN TEKNIK	70.000
95	Rool clamp	BENG. ALAT TEKNIK	150.000
96	Copy lathe attachment	LIPI	2.500.000
97	Grinding rata	MAKMUR SENTOSA	24.000
98	Pembuatan brille 500	YAYASAN WIYATA G	1.000.000
99	Grinding rata	PASUNDAN TEKNIK	48.000
100	Model alumunium	PASUNDAN TEKNIK	68.400
101	Roll pemecah batu	PT MITRA MUGI	122.000
102	Grinding pin	PASUNDAN TEKNIK	96.000
103	EDM	PT MATRA	60.000
104	Pengerasan pipa	PT MBT	52.000

1	2	3	4
105	Roda gigi	MAKMUR SENTOSA	140.000
106	Pembuatan casting weight	PT ARSIMELIN	48.750.000
107	Handle plate	MAKMUR SENTOSA	280.000
108	Pengerasan roda gigi	SUKARAJA PUTRA S	32.000
109	Pengerasan blanking die	PT BIP	32.000
110	Cetakan ring karet	PT INTI KARET	360.000
111	Cetakan batak	HOME INDUSTRY	200.000
112	Seeling & Forming	MAKMUR SENTOSA	600.000
113	Handing plate	MAKMUR SENTOSA	200.000
114	EDM pengasah pisau	PASUNDAN TEKNIK	136.000
115	Cutting capsul	MAKMUR SENTOSA	580.000
116	Alat harmonisasi laser	DISLITBANG AURI	220.000
117	Roll poros grinding	PASUNDAN TEKNIK	64.000
118	Grinding poros	CV INKARID	40.000
119	Pekerjaan EDM	PASUNDAN TEKNIK	36.000
120	Meratakan plat	HOME INDUSTRY	37.000
121	Grinding	ELIN LAMAJAN	250.000
122	Mould philip	PT WIKA BURUJUL	1.750.000
123	Pembuatan pattem	PT BORO MULTI	924.000
124	Pembuatan komponen tekstil	PT PRANATA JAYA	100.000
125	Grinding	ELIN LAMAJAN	250.000
126	Pengerasan pipa	PT MBT	43.000
127	Grinding	PT ELIN	100.000
128	Pembuatan komponen	PT WAHANA GANESA	400.000

1	2	3	4
129	Perbaiki poros engkol	SULZER	875.000
130	Bubut pully	INDO PATTERN	50.000
131	Perbaiki dan pengukuran ulang plat orifis	PT ARUN NGL	300.000
132	Pembuatan komponen tekstil	CV DIANTIKA	66.000
133	Pembuatan medali	MITSUI & CO	4.500.000
134	Pembuatan medali	MITSUI & CO	600.000
135	Pembuatan roll kayu	INDO PATTERN	50.000
			98.809.987
<b>F</b>	<b>PENGUJIAN, STANDARDISASI DAN KALIBRASI</b>	<i>(TESTING, STANDARDIZATION &amp; CALIBRATION)</i>	
1	Kalibrasi jam ukur	PT MEKTAN BABAKAN	90.000
2	Kalibrasi mikro meter	PT BUMI RAYA	150.000
3	Kalibrasi ring gauge dan perlengkapannya	PT DIAN SURYA	90.000
4	Kalibrasi jangka sorong	PT PEMBANGUAN P	160.000
5	Kalibrasi alat ukur	PT EWINDO	90.000
6	Kalibrasi alat ukur	PT BUMI KARYA	60.000
7	Kalibrasi alat dial indikator	BBK	120.000
8	Pengukuran alat bantu ulir 400 x 400 m	BBK	100.000
9	Kalibrasi mikro meter	PT VOKSEL ELECT	200.000
10	Pengukuran Go No Go	PRESISI WIRA	50.000
11	Kalibrasi jam ukur	KALI RAYA SARI	160.000
12	Kalibrasi mikro meter dalam	PT LUFKIN IND.	30.000
13	Penyusunan 28 konsep SNI	PROY. PENGEM. STAN.	9.075.880
14	Pengujian gentong plastik	PT GRAHA FORTUNA	400.000
15	Kalibrasi alat ukur	B4T	660.000

1	2	3	4
16	Kalibrasi jam ukur	PT MEKTAN	150.000
17	Kalibrasi alat ukur	PT VOKSEL ELECT.	220.000
18	Kalibrasi alat ukur	PT WIKA JATIWANGI	170.000
19	Kalibrasi alat ukur	PT WIKA JATIWANGI	150.000
20	Kalibrasi	PT DCHNEIDER	400.000
21	Kalibrasi alat ukur	BPI SURABAYA	5.940.000
22	Kalibrasi jangka sorong	PT PEMBANGUAN P	30.000
23	Kalibrasi jam ukur	KANWIL NUSRA	315.000
24	Kalibrasi a.u. termocouple	PT WIKA JATIWANGI	150.000
25	Kalibrasi dial indicator	PT BUKAKA	150.000
26	Kalibrasi alat ukur	PT TEXMACO	205.000
27	Kalibrasi	PT KALIRAYA SARI	200.000
			19.515.880
<b>Jumlah A + B + C + D + E + F +</b>			<b>1.424.973.017</b>
<b>Grand Total (Pembulatan)</b>			<b>1.424.973.000</b>

**KEGIATAN JASA PELAYANAN TEKNIS  
BALAI BESAR PENGEMBANGAN INDUSTRI LOGAM DAN MESIN  
TAHUN ANGGARAN 1995 / 1996**

No.	NAMA KEGIATAN	NAMA INDUSTRI / PELAKSANA	NILAI (Rp)
1	2	3	4
	<b><u>LITBANG TEKNOLOGI PROSES</u></b> (R&D)		
1	Analisa Kegagalan Impeller pompa mersible	PT. Jababeka	2.049.600 ✓
2	Pembuatan Mangkok Pengeruk dari Baja	Proyek Puspiptek	113.387.550 ✓
3	Pembuatan Cetakan Sepatu	PT. Citra Sarana	66.000.000 ✓
4	Pembuatan Spindle Tapping machine	PT. Nimarua Jaya	1.500.000 ✓
	<b><u>PENDIDIKAN DAN LATIHAN</u></b> (TRAINING)		182.937.150
1	Training AutoCAD	Perum Peruri	3.750.000
2	Diklat Juru Las	PT Semen Padang	18.000.000
3	Training AutoLisp and Database	Puspetindo dan PT WIKA	3.250.000
4	Training NC Milling	Perum Peruri	4.000.000
5	Praktek Pemesinan	TMI Unwim	2.280.000
6	Kualifikasi Juru Las	PT Tambang Timah	42.372.000
7	Diklat Las Perawatan	PT Esabindo	6.831.000
8	Training CAD/CAM	PT BARATA	2.000.000
9	Training Pengelasan	Balitbang Ind. Padang	400.000
10	Training Pengecoran	Petrokimia	11.000.000
11	Diklat Perlakuan Panas	SIEMENS	2.290.000
12	Diklat Pra Asesor ISO 9000	Pustan	7.100.000
13	Diklat Las GMAW	PT. Esabindo	4.232.400
14	Diklat Tek. Pengecoran	IWPL	81.900.000
15	Diklat Jig & Fixture	IWPL	66.000.000
16	Diklat Peningk. Kemampuan Teknik Mekanik	Dinas Perindustrian	55.170.000
17	Workshop Peningkatan Kemampuan negosiasi alih Teknologi	Proy. Pengembangan Tek. Rancang, Logam & Rekayasa - Depperind	9.300.000
18	Diklat Perlakuan Panas, montage, gambar	PT Tambang Timah	40.500.000
19	Praktikum Teknologi	UNWIM	4.600.000
20	Diklat mutu & efisiensi industri automotive	IWPL	43.000.000
21	Diklat Pande Besi - Jawa Barat	Dinas Perindustrian Jabar	60.000.000
22	Diklat Las perawatan tahap I	PT. Esabindo Pratama	6.831.000
23	Kualifikasi juru las	PT. Indah Kiat	3.500.000
24	Diklata Heat treatment dan metalurgi	Balai Industri Medan	1.660.000
25	Diklat perancangan	balai Industri Ambon	1.500.000
			481.466.400

1	2	3	4
	<b><u>JASA KONSULTASI &amp; SUPERVISI</u></b> (CONSULTATION AND SUPERVISION)		
1	Superv. Engin. Bejana Tekan & Tangki Timbun	PT. Gita Monika	28.820.000
2	Superv. Fabrikasi & Manajemen	PT Wika - DKI	95.340.000
3	Superv. Bidang Tooling (die komponen)	PT. Kejali Mitra	40.528.950
	<b><u>STANDARDISASI DAN KALIBRASI</u></b> (STANDARDIZATION & CALIBRATION)		164.688.950
1	Kalibrasi	PT Pancajaya	380.000
2	Kalibrasi	PT Voksel Elektro	600.000
3	Kalibrasi	PT Wika	140.000
4	Pengujian sub komponen	PT Dasa Windu A	900.000
5	Kalibrasi	BB Keramik	130.000
6	Kalibrasi	PT Kaliraya	200.000
7	Kalibrasi	PT Prima Alloy	820.000
8	Kalibrasi	PT Wika Jatiwangi	30.000
9	Kalibrasi	BB Selulosa	447.000
10	Kalibrasi	BB Keramik	60.000
11	Pengujian	PT Wika	150.000
12	Kalibrasi	PT Federal Super	1.200.000
13	Kalibrasi	PT Gizinda prima	660.000
14	Kalibrasi	PT Bumi Kaya	430.000
15	Kalibrasi	PT WIKA	220.000
16	Kalibrasi Thermometer	PT Voksel	100.000
17	Kalibrasi	PT Kalirayasari	500.000
18	Kalibrasi & Sertifikasi	PT Gizinda	240.000
19	Kalibrasi Thermocouple	BB Keramik	150.000
20	Mikrometer	PT Voksel	110.000
21	Uji Tarik	Indo Intrusion	120.000
22	Thermocouple	PT. Gizindo	2.100.000
23	Kalibrasi Furnace	PT. Voksel	600.000
24	Pengujian Plat Baja	PT Indospring	300.000
25	Siku Baja	PT WIKA	215.000
26	Jangka Sorong	BB Keramik	110.000
27	Kalibrasi Ring Gauge	Politeknik	2.310.000
28	Kalibrasi alat ukur	BBK	140.000
29	Kalibrasi alat ukur	PT Barata	480.000
30	Kalibrasi alat ukur	PT Ewindo	750.000
31	Kalibrasi	PT Bumi Karya	103.000
32	Pengujian kekerasan vihers	Mahasiswa UJ	50.000
33	Kalibrasi alat ukur 65 buah	PT Texmaco	3.354.000
34	Kalibrasi alat ukur 45 buah	PT Texmaco	2.340.000
35	Kalibrasi Jam Ukur	PT MBT	45.000
36	Kalibrasi mesin tarik	Balai Logam Medan	1.906.650
37	Kalibrasi jam ukur	PT MBT	55.000
38	Kalibrasi alat ukur 20 buah	PT Texmaco	1.050.000
39	Kalibrasi gauge block	BBIK	1.525.000
40	Pengujian hasil las	PT WIKA DPI	450.000
41	Kalibrasi	Arun NGL	1.540.000
42	Kalibrasi alat ukur	Arun NGL	1.540.000
43	Kalibrasi gauge block	BBIK	125.000
44	Kalibrasi alat ukur	B4T	390.000

1	2	3	4
45	Kalibrasi alat ukur	Texmaco	2.983.200
46	Pengujian hasil las	PT WIKA	1.250.000
47	Kalibrasi	Magna Kabel Nus	100.000
48	Kalibrasi Pengukuran	PT WIKA	50.000
49	Kalibrasi alat ukur	Texmaco	3.500.000
50	Pengujian Ultrasonic	PT WIKA DPI	600.000
51	Pengujian tanki baja	PT WIKA DPI	1.250.000
52	Kalibrasi alat ukur	Balai Pen. Logam Medan	756.000
53	Kalibrasi alat ukur 28 buah	PT Texmaco	1.680.000
54	Kalibrasi jam ukur	PT INTI	925.000
55	Kalibrasi	Texmaco	1.200.000
56	Kalibrasi	B4T	640.000
57	Kalibrasi	Magna	230.000
58	Kalibrasi alat ukur	PT Texmaco	3.648.000
59	Kalibrasi alat ukur	PT Texmaco	3.000.000
60	Pengujian ultrasonic	PT WIKA	600.000
61	Kalibrasi alat ukur	PT INTI	805.000
62	Pengujian komposisi kimia	PT Prasajaya	400.000
63	Pengujian cercular	PT Perkebunan XII	800.000
64	Kalibrasi thermocouple	PT Gisindo	400.000
65	Kalibrasi pressure gauge	PT Sanggar Sarana Baja	150.000
66	Kalibrasi gauge block	PT. Texmaco	1.037.000
67	Kalibrasi alat ukur	PT. Sheineder	400.000
68	Kalibrasi alat ukur	BBIK Jakarta	1.137.000
69	Komparasi unjuk kerja peralatan lab. pasir	PT. Agrindo Surabaya	3.680.000
70	Kalibrasi alat ukur	PT. Texmaco	3.860.000
71	Kalibrasi alat ukur	PT. Texmaco Karawang	1.600.000
72	Kalibrasi	BBIK	100.000
73	Kalibrasi	Balai Industri Semarang	100.000
74	Kalibrasi alat ukur	PT. Texmaco	2.070.000
75	Kalibrasi alat	CV. Bina Buana	30.000
76	Kalibrasi alat ukur	PT. Texmaco	1.455.000
77	Uji tarik sample baja	PT. Wijaya Karya	1.500.000
78	Kalibrasi mesin uji	PT. Rajin	1.328.800
79	Kalibrasi waterpass	PT. Bani Nusa	100.000
80	Kalibrasi mistar baja	PT. Texmaco	50.000
81	Kalibrasi arifis	PT. Arum	990.000
82	Pengujian kekerasan	PT. Edindo Elektrik	50.000
83	Kalibrasi alat	PT. Pelabuhan Indonesia II	1.975.000
84	Pemeriksaan Komposisi kimia	PT. Wijaya Karya	180.000
85	Kalibrasi alat	PT. Pembang. Perumahan	1.042.800
86	Kalibrasi alat	PT. Inti Raya	300.000
87	Kalibrasi alat	PT. Barata	3.436.400
			80.454.850

1	2	3	4
	<b>PEMBUATAN PRODUK</b> ( <i>PRODUCT MANUFACTURING</i> )		
1	Pengerasan Roda Gigi	PT. ESSA	54.000
2	Dudukan Poros Mesin Tekstil	PT Yogi Saputra	5.300.000
3	Pembuatan Baud	CV. Inkaret	500.000
4	Pengerasan Induksi	PT Esaa	43.000
5	Pengelasan Box	Mansyur	120.000
6	Grinding Pen	CV. Pasundan Tek	700.000
7	Suku Cadang Kritis	Dislitbang TNI -UI	1.750.000
8	Pembuatan Komponen Tekstil	PT Indra	800.000
9	Pembuatan Braile	Wyoto Guna	1.750.000
10	Perb. Cutting Die	CV. Makmur Sentosa	200.000
11	Pemb. Cetakan capsul	Pos. Teknik	1.750.000
12	Pengerasan Pipa	PT. MBT	32.250
13	Pengelasan cap lampu	Ismail	50.000
14	Pembuatan pattern	PT Wika	4.655.325
15	Perb. Komponen die casting	PT Wika	780.000
16	Pengerasan dengan Induksi	CV Kasih Setia	43.000
17	Grinding Pisau	PT GFI	1.020.000
18	Perbaikan Cetakan sabun	PT Makmur Sentosa	2.250.000
19	Pembuatan Komponen Tekstil	PT Pranata Jaya	96.000
20	Pembutan Pattern	PT Komatsu Ind.	25.500.000
21	Alat Potong bbr kertas	BBS	400.000
22	Pembuatan Komponen tekstil	Diantika	156.000
23	Pemb. Pattern trubine	Haryono	2.000.000
24	Komponen gear box	Hadotek	1.000.000
25	Pembuatan runner blade	Citra Labuan Tirta	1.020.000
26	Pengelasan Engine	PT Wahana	500.000
27	Surface Grinding	Mada Wikri	250.000
28	Pengerasan klem odge	Spectra	161.250
29	Pembuatan helix gear	PT Pupuk Iskandar Muda	3.120.000
30	Grinding plate	PT Budikari	660.000
31	Grinding bushing	PT Essa	100.000
32	Pengelasan tabung	PT Celco	250.000
33	Pemb. Komponen Tekstil	Matra	174.000
34	Pemb. & Perbaikan Wicket gate bushing	PT Sulzer	44.920.000
35	Pengelasan Rak botol	PT Celco	250.000
36	Perbaikan mesin bubut	PT Patal Banjaran	11.495.000
37	Pembuatan Braille	PT Mega Teknik	1.500.000
38	Pembuatan Casting	Hoples Citra	292.000
39	Pembuatan alloy bos dari baja paduan	PT. Coster	850.000
40	Pembuatan komponen tekstil	CV. Diantika	256.000
41	Pengerasan pipa	PT. MBT	43.000
42	Pembuatan casting	PT. Hapeles Citra	200.000



1	2	3	4
43	Hard Crom list	PT. Bintang Paramita	432.000
44	Hard Crom	PT. Bintang Paramita	380.000
45	Pengerasan Engine transport	PT. Wahana	250.000
46	Pengerasan klem	PT. Spectra	107.000
47	Pembuatan komponen tekstil	PT. Keramik	175.000
48	Proses Aging strain	PT. Cibadak	10.000
49	Pengerasan klem	PT. Spectra	64.500
<b>TOTAL</b>			<b>118.409.825</b>
<b>TOTAL</b>			<b>1.027.957.175</b>

IMPLEMENTATION PROGRAM OF THE JICA'S AID  
SUPPORTING INDUSTRIES DEVELOPMENT OF  
CASTING PRODUCTS FOR AUTOMOTIVE COMPONENTS

Duration of JICA's aid : 5 (five) years.

INTRODUCTION :

\*) For a developing country, foundry ind. is the most important supporting ind. & acts as one of strategic pillars for ind. struct. which finally will determine econ. situation of a nation.

\*) Sharing ratio b/w import/export of manufacturing industry in 1990 is 2.24 ( Hayashi Mitsuhiro - JICA June 1996).

\*) The import value tends to increase (Res. & Dev. for Ind. & Trd. Agency - One Day Seminar - Aug.29-96)

Fact findings :

@) Domestic ind. very weak in "advanced mat." process technologies esp. for automotive comp. ==  
==> only  $\approx$  30 % from 150,000 ton cast prod.('95), beyond replacement.

@) Not ready to compete ==> "threat" ind. structure

@) Require assistance seriously to overcome

@) In advanced countries, found. indst. ==> "sun-set"

\*) Jica's aid will be used to foster and modernize foundry industries to self-supply the Indonesian demand and even to export their products.

- ⊗ MIDC is the only formal institute under the Min.of Ind. & Trade. to technically support domestic foundry ind. includes the foundry management.
- ⊗ However, all equipment are old fashion & lack # of foundry personnel.

#### **MAIN OBJECTIVES**

- ⊗ To develop domestic foundry industries through transferring foundry technologies.
- ⊗ To suppress sharing import & to enhance sharing export of casting products.

#### **SHORT TERMS OBJECTIVES (strengthening of the MIDC)**

- @ ↑ Equipment
- @ ↑ Know how of F.T.
- @ ↑ H.R.D. (quantity & quality)
- @ ↑ Management & organization

**STEPS TO DO :**

**@). Establishment of Foundry Technology Research Center (FTRC) ==> strengthening of the existed foundry shop.**

**Fund sources : ADB, JICA, & GOI input.**

**@). Establishment of Foundry Production Training Center (FPTC) ==> direct medium to transfer Found.Tech.**

**Built up beyond the MIDC complex**

**Fund sources : ADB & GOI input.**

**@). Foundry product testing (ISO-9000& QS-9000 ) includes.**

**MEDIUM OBJECTIVES (2000 - 2005), stressed on external targets :**

**@. To train 100 trainees per year from 20-25 industries ==> how to produce difficult products, management (package).**

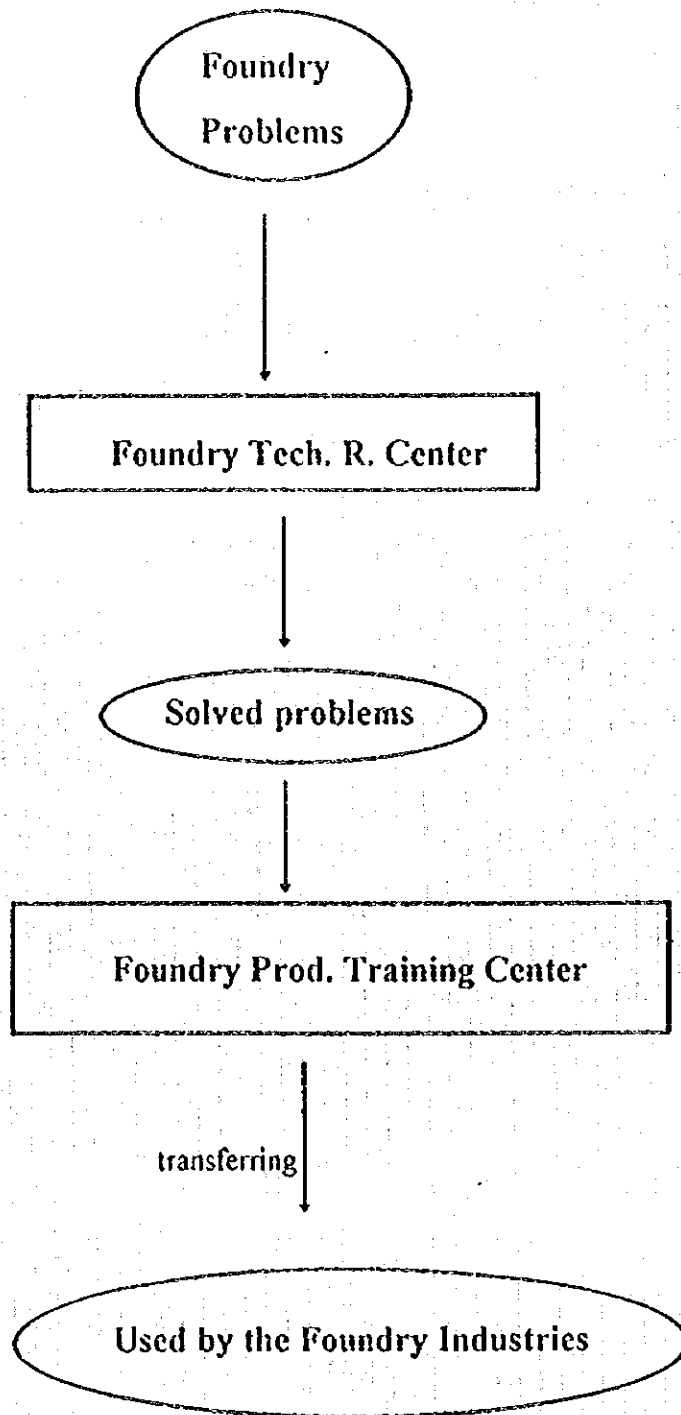
**@. Up to 2005, at least 135 new industries (entrepreneurship).**

**LONG TERMS OBJECTIVES (UP TO 2010):**

- @. Domestic SME are able to penetrate global market**
- @. FTRC is ready to perform internationally joint research**
- @. FPTC opens up international training for under/ developing countries.**

**LONG TERMS OBJECTIVES (UP TO 2010) :**

- @. Domestic SME are able to penetrate global market**
- @. FTRC is ready to perform internationally joint research**
- @. FPTC opens up international training for under/ developing countries.**



Scope of work :

a). Only for foundry and die casting technologies

==> automotive components and its quality assurance

b). Tech. Assistance :

pattern making, molding, casting design, casting defect analyses, foundry metallurgy, die casting , die making for the die casting, quality control and foundry management.

c). JICA's fund will be used to train MIDC' staffs in Japan

d). JICA's aid will be used to fund the implementation and dissemination in foundry industries,

e). JICA's experts and MIDC' staffs must intensively identify and classify : material spec., sophistication design , required foundry and machining technology as well.

f). The R & D activities will be carried out in MIDC foundry shop and the results must meet international standards.

g). The chosen foundry industries must have cooperation with automobile industries. JICA's experts are expected to participate to generate the cooperation.



## **ACTIVITIES PROGRAM**

### **@. Preparation :**

- 1. Inventory of the components and tech. spec.**
- 2. Classification of difficulty level.**
- 3. Determination of appropriate tech. & test processes.**
- 4. Arrangement of needed equipment from JICA.**
- 5. Arrangement of JICA's experts and determination of the needed training for the MIDC' staffs.**
- 6. Creating coop. & interlikage w/t l. sc. ind. & other institutes.**

### **@. Scheduling of Activities (tentative):**

- # First up to third year of the program ==> strengthening**
- # Technical asst. to industries ==> started on the second year**
- # Dissemination ==> after the first year of the aid**
- # Complete schedule ==> see Table 1.**

### **@. Technology Dissemination :**

- 1. Preparation after the results match the international standard quality.**
- 2. Preparing technology package for the dissemination**
- 3. Dissemination through short training, seminar and other publications.**

## **COST OF THE PROJECT**

### **@). JICA's AID :**

1. To fund JICA's experts : 14 persons for 200 man-months includes international and domestic trips.
2. To fund training of MIDC' staffs : 23 persons fro 96 m-m.
3. To provide needed equipment (complementary of ADB-project).
4. Fund estimation, see Table 2

### **@). COUNTER BUDGET**

1. Operational cost for national counterparts.
2. Administration cost.
3. Miscellaneous cost.
4. Complete expenditure only for 1-year , Table 3.

### **@). TECHNO-ECONOMIC APPROACH**

(T-E) must also be formulated by both expert & MIDC' staffs.

TABLE 1.

1st YEAR SCHEDULE

NO.	ACTIVITY	MONTH												REMARK	
		1	2	3	4	5	6	7	8	9	10	11	12		
1	General preparatory	xxx	xxx												
2	Research preparation		xx	xxx	xxx										
3	Produk evaluation			xx	xxx										
4	Casting design				xxx	xxx									
5	Pembutan pola					xxx	xxx	xxx							
6	Moulding						xxx	xxx	xxx						
7	Prototyping							xxx	xxx	xxx					
8	Examination								xxx	xxx					
9	Performance test										xxx	xxx			
10	Evaluation & report													xxx	

## TENTATIVE SCHEDULE FOR R&amp;D AUTOMOTIVE CASTING PARTS TECHNOLOGY

AUTOMOTIVE PARTS	MATERIAL	YEAR )				
		I	II	III	IV	V
<b>ENGINE PARTS</b>						
1. Flywheel	FC-25, FCD	* O				
2. Exhaust manifold	FC-25	≠ O				
3. Intake manifold	Al-die cast		O			
4. Cylinder head cover	Al-die cast		O			
5. Crankshaft	FCD				O	O
6. Camshaft	FCD	≠	≠	O		
7. Main bearing cap	FCD			O		
<b>BRAKE SYSTEM</b>						
1. Brake drum	FC-25, FCD	O				
2. Brake disc	FCD	O				
3. Brake disc caliper	FCD	*	* O			
4. Master brake cylinder	FCD, Al die cast	*	* O	O		
5. Brake wheel cylinder	FCD, Al die cast		O	O		
<b>TRANSMISSION</b>						
1. Clutch pressure hub	FCD	* O				
2. Clutch pressure plate	FCD	O				
3. Gear transmission housing	Al-die cast				O	
4. Differential case	FCD			O		
<b>STEERING SYSTEM</b>						
1. Steering gear housing	FCD		O			
2. Steering knuckle	FCD				O	
3. Front wheel hub	FCD			O		

REMARK:

) AFTER PREPARATION AND INSTALLATION FINISH

Table 3 : Training And Duration

No.	Major	Persons	Duration (months)	Man-month
1.	Pattern making	2 (two)	4	8
2.	Moulding Technology	2 (two)	3	6
3.	Casting design & casting defect analyses (engineering level)	2 (two)	6	12
4.	Foundry metallurgy	2	4	8
5.	Die casting	3	4	12
6.	Die making for die casting	2	3	6
7.	Product development and design	2	5	10
8.	Die design	2	5	10
9.	Accessor for Qs-9000 certified by Japanese Institute	4	4.5	24.18
10.	Product & Performance testing	2	3	6
Total				96

Table 4 : Expertise And Duration

No.	Major Of Expertise	Person	Duration (man-month)
1.	Pattern making ( wood and Epoxy)	1	18
2.	Pattern making (metal)	1	6
3.	Sand moulding	1	20
4.	Casting design	1	12
5.	Casting defect analyses	1	6
6.	Foundry metallurgy	1	12
7.	Die casting process	1	18
8.	Die making for die casting	1	18
9.	Engineering design and product development	1	18
10.	Die design	1	18
11.	Quality control	1	12
12.	Machining	1	12
13.	Quality Assurance	1	18
14.	Automotive engineering	1	12
Total			200

**Table 5 : Estimated Expert and Fellowship Cost**

No.	Type of Expenses	Calculation	Total US \$
1.	<i>JICA's Experts</i>		
1.1.	Allowance	200 mm x \$ 13,000	2,600,000
1.2.	Air fare	14 persons x \$ 2,500	35,000
2.	Training Fellowship		
2.1.	Allowance	84 mm x \$ 8,000	672,000
2.2.	Air fare	21 persons x \$ 2,500	52,500
3.	Domestic Travel	200 mm x 5 d/mm x \$ 250	250,000
4.	Vehicles	4 vehicles x \$ 30,000	120,000
5.	Seminars	5 years x 2 sen/year x \$ 7,500	75,000
6.	Preliminary implementation and negotiation	3 team x 4 year x \$ 7,500	90,000
7.	Contingencies		
	<b>T o t a l</b>		<b>3,804,500</b>

PROJECT SUPPORTING INDUSTRY IN INDONESIA -- JICA JAPAN  
FOR AUTOMOTIVE CASTINGS PART TECHNOLOGY DEVELOPMENT

## MACHINERIES &amp; EQUIPMENTS CONTRIBUTION

MACHINERIES & EQUIPMENT	PROCUREMENT CONTRIBUTION			REMARK
	MIDC	ADB	JICA	
<b>A. FOUNDRY</b>				
<b>I. MELTING</b>				
1. Induction furnace, 250 kgs		○		
2. Geared pouring ladle		○		
3. Geared Mg. treatment ladle		○		
4. Ladle heater		○		
5. Furnace dust/smoke collector unit & ducting			○	
6. Balance for charging material		○		
7. Crane balance		○		
<b>II. MOULDING</b>				
1. Hi press. blow squeeze moulding machine		○		
2. Mould jacket			○	
3. Bottom board		○		
4. Mould weight		○		
5. Pallet car		○		
6. Pallet railing			○	
<b>III. SAND PREPARATION</b>				
1. Sand miller	○		○	If necessary
2. Water dosage unit			○	
3. Additive dosage unit (bentonite, coal powder)	○			
4. New sand dosage unit	○			
5. Airator	○		○	If necessary
6. Sand conveying system	○	○		Repair & replacement
7. New sand hopper	○			
8. Control panel for system	○		○	Repair & replacement
<b>IV. SAND RECLAMATION</b>				
1. Drum cooler			○	
2. Magnetic separator	○			
3. Rotary/vibrating screen			○	
4. Sand cooler			○	If necessary
5. Sand silo	○			
6. Sand conveying system	○	○		Repair & replacement
7. Dust collector & ducting		○	○	Complement
8. Control panel for system	○	○		Repair & replacement
<b>V. CORE MAKING</b>				
1. Shell core machine		○	○	Complement.
2. Core blower		○		
Core sand mixer		○		



MACHINERIES & EQUIPMENT	PROCUREMENT CONTRIBUTION			REMARK
	MIDC	ADB	JICA	
<b>V. FETTLING &amp; CLEANING</b>				
1. Apron type shot blast machine			0	
2. Cut off machine		0		
3. Grinding machine		0		
<b>VI. HANDLING</b>				
1. Forklift		0		
2. Overhead crane		0		
<b>VII. UTILITY</b>				
1. Air compressor		0		
2. Transformer/power station	0			
3. Water supply	0			
<b>B. DIE CASTING SHOP</b>				
1. Cold chamber pressure die casting		0		
2. Liquid metal transfer unit			0	Complement
3. Electric resistance furnace		0		
4. Trimming press			0	Complement
5. Extractor unit			0	Complement
6. Spray unit			0	Complement
<b>C. CONTROL &amp; TEST</b>				
1. Pyrometer		0		
2. CE meter		0		
3. Nodularity detector		0		
4. Spectrometer		0		
5. C & S determinator			0	
6. Hardness tester		0		
7. Tensile strength tester		0		
8. Charpy tester		0		
9. Ultrasonic flaw detector		0		
10. Metallographic tester		0		
11. Sand testing equipments	0			
12. Performance test equipments			0	Special design

Table 2 : Equipments for Completion

		USD
MACHINERY & EQUIPMENT	QTY	REMARK
1. Furnace dust/smoke collector unit & ducting	1 set	
2. Mould jacket	20 pcs	
3. Pallet railing	1 set	
4. Sand muller	1 unit	
5. Water dosage unit	1 unit	
6. Airater	1 unit	
7. Control panel for system	1 set	
8. Drum cooler	1 unit	
9. Rotary/vibrating screen	1 unit	
10. Sand cooler	1 unit	
11. Dust collector & ducting	1 unit	
12. Shell core machine	1 unit	
13. Apron type shot blast machine	1 unit	
14. Liquid metal transfer unit for die casting	1 unit	
15. Trimming press for die casting	1 unit	
16. Extractor unit for die casting	1 unit	
17. Spray unit for die casting	1 unit	
18. C & S determinator	1 unit	
19. Performance test equipments for automotive parts	1 set	
<b>TOTAL COST ESTIMATION</b>		

PROJECT SUPPORTING INDUSTRY IN INDONESIA - JICA JAPAN  
FOR AUTOMOTIVE CASTINGS PART TECHNOLOGY DEVELOPMENT

ACTIVITIES DEVELOPMENT CONTRIBUTION

Activities	Development Contribution			Remarks
	MIDC	ADB	JICA	
1. Training - Skilled worker - Supervisor - Engineer	○ ○	○	○	Training by Production
2. Technical Assistance and Supervising - Small industry - Medium industry - Big industry	○ ○ ○	○ ○	○ ○	
3. R & D - Short term (max 6 months) - Medium term (max 12 months) - Long term	○ ○ ○		○	
4. Production - Limited quantity - Tailor made	○	○		
5. Pattern making	○	○		
6. Components prototyping	○	○		
7. Consultation	○	○	○	
8. Testing and Analysis foundry materials	○			
9. Certification	○			

付属資料5. 裾野産業育成構想

**IMPLEMENTATION PROGRAM FOR  
THE DEVELOPMENT OF SUPPORTING INDUSTRIES  
IN INDONESIA**

**METAL INDUSTRIES DEVELOPMENT CENTRE**  
Bandung, December 1996

## CONTENTS

- I. BACKGROUND.
- II. IMPLEMENTATION PROGRAM FOR STRENGTHENING OF IRDMM'S TECHNICAL SUPPORT CAPABILITIES FOR THE FOUNDRY INDUSTRIES
- III. 5 YEARS PROGRAM (1997 - 2002).
  - 1. Objective.
  - 2. Program.
  - 3. Activity.
- IV. 1997/1998 PROGRAM
  - 1. Objective.
  - 2. Program.
  - 3. Activity.
  - 4. Tentative schedule.
- V. METAL WORKING INDUSTRIAL ESTATE FOR SMI DEVELOPMENT
  - 1. ESTABLISHMENT OF BANDUNG INDUSTRIAL PARK.
  - 2. ESTABLISHMENT OF FOUNDRY AND MACHINING CENTRE IN CEPER.
    - 1). Objective.
    - 2). Mission.
    - 3). Location.
    - 4). Financial sources.
- VII. ACTION PLAN OF JICA.

## **IMPLEMENTATION PROGRAM FOR THE DEVELOPMENT OF SUPPORTING INDUSTRIES IN INDONESIA**

### **I. BACKGROUND.**

Based on the list of action recommended which is proposed by JICA for development of the supporting industries in Indonesia, the Program for Strengthening of IRDMMI's Technical Support Capabilities for the Foundry Industries is included in the program of JICA's assistance which has been recommended.

Among 14 programs in the list recommended, there are three programs which are very closed to the program of MIDC, namely, Program no. 1 Strengthening of IRDMMI's technical support capabilities for the foundry industry, program no. 5 - Sub-Contractor Development Program and no. 10 - Metal Working Industrial Estate for small and medium scale industries development.

The Program for Strengthening of IRDMMI's Technical Support will be directed to strengthen MIDC in casting technology for manufacturing automotive components, and later this casting technology will be transferred to small and medium scale casting industries through the Programs of Technical Assistance or Trainings. Strengthening Program of IRDMMI's Technical Support has been provided in the Blue Book No. ID.38.96.0310 entitled " Supporting Industries Development in Indonesia - Cast Product for Automotive Components".

There are two MIDC's programs related with Program no. 10 - Metal Working Industrial Estate for small and medium scale industries development i.e., establishment of industrial park in Bandung West Java and establishment of technology infra structure for the development of iron foundry SMI in Ceper Central Java.

Especially for Bandung (Batujajar), at present it is being negotiated with ASPEP and West Java Government to establish Industrial Park, which is in the center of the park the Foundry Production Training Centre (FPTC) will be set up by the assistance of Asian Development Bank (ADB).

The ADB Loan project namely ITHRD (Industrial Technology and HRD) project. The Industrial Park in Bandung will be occupied not only by local small and medium scale industries but also by relocation industries from foreign countries as well. Therefore, JICA's assistance program for MIDC will be directly support the preparation of Industrial Park in Bandung. Program of human RD in the fields of casting and die casting for manufacturing automotive components as the partner of big industry, like ASTRA.

## II. IMPLEMENTATION PROGRAM FOR STRENGTHENING OF IRDMMI'S TECHNICAL SUPPORT CAPABILITIES FOR THE FOUNDRY INDUSTRIES

Implementation Program of JICA's assistance project and its relation with Industrial Park and Sub-Contractor Development Program can be seen in Figure 1.

Strengthening Program of IRDMMI's Technical Support is covering:

- 1). Preparation of skilled technicians and staff of MIDC through local and overseas trainings in the fields of design, casting, and die making, and later they are expected to be able to provide technical assistance to industries.
- 2). Preparation of casting workshop from the present condition (Belgian Assistance) to the condition required by ADB Program and JICA's assistance as the complements to be able to develop automotive products (casting) either through R/D or experiments.
- 3). Dissemination of casting technology for manufacturing automotive components to small and medium scale industries and casting industries around the Industrial Park.
- 4). TA doing by JICA will be synergized with the assembler namely PT. ASTRA together with MIDC to assist the SMI.
- 5). Develop partnership between small and medium scale industries inside and outside the Industrial Park and automotive industries/assemblers.

In order to give the direct information, monitoring and evaluation, an Advisory Board will be established with the members consisting of BAPPENAS, BPPIP, DJILMK, Governor of West Java; MIDC, and GIAM. While for the guarantee of quality agreement from industries as the partner of big industries, Quality Assurance Program of MIDC including calibration and testing of products from small and medium scale industries as sub-contractors, will be established.

## III. 5 YEARS PROGRAM (1997 - 2002).

### 1. Objective.

The main objective of the program is to carry out R&D for mastering of manufacturing technology of automotive cast components and to be disseminated into SMI supporting industries.

### 2. Program.

The main programs are :

- 1) R & D preparation
- 2) R & D execution supported by JICA experts.
- 3) Overseas training of MIDC technical staffs
- 4) Manufacturing technology dissemination.

### 3. Activity.

The main activities are :

- 1) Product analysis and evaluation
- 2) Preparing technical specification and drawing

- 3) R&D planing and programming
- 4) R&D facilities preparation
- 5) R&D execution and evaluation
- 6) Mastering of manufacturing technolgy through :
  - overseas training MIDC staffs
  - preproduction experimentation in foundry training centre plant.
- 7) Manufacturing technology dissemination through :
  - short course
  - seminar
  - magazine
  - technical guidance
  - technical assistance

#### IV. 1997/1998 PROGRAM

##### 1. Objective.

The main objective of the first year program 1997/1998 is the selection of product of automotive cast components that should be developed for pilot project.

##### 2. Program.

The main program are :

- 1) preparation of JICA's aid
- 2) JICA experts recruitment
- 3) selection of products

##### 3. Activity.

The activities are :

###### a. Preparatory of JICA aid :

- 1) Preliminary visit of GOI team to Japan
- 2) Preparatory of bilateral agreement
- 3) Bilateral specific agreement
- 4) Set up technical assistance organization : steering committe, organizing committee, MIDC-JICA team work
- 5) Detail programming.
- 6) Recruitment MIDC staffs.

###### b. JICA expert recruitment.

- 1). Expert qualification requirements
- 2). Expert proposal
- 3). Expert selection
- 4). Expert recruitment according to the priority
- 5). Expert assignment.

###### c. Selection of product.

- 1). Product inventory
- 2). List of products



- 3). Product selection
- 4). Product priority list

4. Tentative schedule.

The tentative schedule of the action plan 1997/1998 can be seen in Figure 2

## V. METAL WORKING INDUSTRIAL ESTATE FOR SMI DEVELOPMENT

### I. ESTABLISHMENT OF BANDUNG INDUSTRIAL PARK.

The short term objective of this program is aimed at establishment of an industrial park, especially for supporting industries managed by developer. The long term objective is to establish an integrated industrial estate for small and medium industries. The industrial park will be located in Batujajar area, about 8 km from toll gate Padalarang and about 20 km from Bandung city, West Java. The area for the first stage is about 7 hectares and the second stage about 20 hectares for the expansion.

The initial development will cover :

- 1). Development of site infra structure. The developer as a management of an industrial park will sell the land and the standard factory building of 1000 m<sup>2</sup> through the system of house ownership credit.
- 2). Development of technology infra structure by MIDC; started by establishing FPTC (Foundry Production Training Centre) located on 5000 m<sup>2</sup> area , followed by machining and forging centre.
- 3). Establishment as soon as possible 20 small and medium supporting industries which belong to ASPEP members.
- 4). Setting up of market assurance by ASTRA. ASTRA together with MIDC and JICA will manage SMI to assure standard products.
- 5). Financial support for the land and building will be provided by Brunei Darusalam loan or other banking resources. Financial support for the machineries will be provided by Islamic development Bank (IDB) and ADB loan as well. MIDC is committed to obtain ADB loan for establishing FPTC (the first stage) on the space of 5,000 m<sup>2</sup> (donated by ASPEP) and the following loan for forging and metal forming will be provided by IDB. Around 20 SMI will obtain soft loan from IDB around US \$ 35 million through coordination of BAPPENAS and Directorate General of Metal, Machinery and Chemical Industry.
- 6). Feasibility study is being conducted by consultant for IDB loan.

The above mentioned programs have been discussed and got fully support from the Governor of West Java, Director General of ILMK, the Head of BPPIP, the Chief of BAPPEDA of West Java and the Head Bureau for Industry and Trade of BAPPENAS .

## 2: ESTABLISHMENT OF FOUNDRY AND MACHINING CENTRE IN CEPER.

Development for the Centre of Iron Foundry in Ceper Klaten, Central Java, is aimed to improve the technology of the foundries so that they will be able to produce quality casting for automotive and another machineries parts.

For the initial stage of iron foundry development in Ceper, the establishment of Testing Laboratory have been carried out this year (1996/1997). This laboratory will be equipped with the apparatus for testing of moulding sand, chemical composition of cast iron, microstructure/metallography of metal, mechanical properties of metal, process control for molten metal. The Testing Laboratory is scheduled to be finished on March 1997, and trial operation starting on April 1997. MIDC will manage the operation of this laboratory during 3 years.

### 1. Objective.

There are two objectives of the development of foundries in Ceper. Firstly, establishment of technology infrastructure in order to facilitate the technology for manufacturing cast products for automotive components and machineries i.e., the establishment of Foundry and Machining Centre as the complement of the Testing Laboratory being constructed this year. Secondly is restructuring of some potential foundries in Ceper in order to manufacture a quality casting for automotive and other machineries parts.

### 2. Mission.

#### a. Foundry Centre.

This centre will give services in the fields of foundry plant engineering and design, foundry process development, cast product development, quality control development, pattern making, training for worker, and as a pre production foundry.

This centre will be equipped with complete machineries and equipments for pattern making, melting, moulding, sand plant and fettling; and will be designed as a continuous production line, but in a small size foundry plant. The building for the centre has being constructed this year, financed by Indonesian Government.

#### b. Machining Centre.

This centre will give services in the fields of machining plant layout, machining process development, machining of precision cast products, jig and fixture, cutting tools sharpening and metrology. This centre will be equipped with CNC precision machine tools (lathe, milling etc), tools sharpening machine and measuring equipments (metrology).

#### c. Restructuring of Potential Foundries.

In order to restructure about 20-30 potential foundries in Ceper, the equipment and the skill and knowledge of the workers should be developed. Thus, it is expected that the potential foundries will improve their foundry technology.

### 3. Location.

The Foundry and Machining Centre will be located together with the Testing Laboratory being constructed in Ceper, where the land has been prepared by local government for about 10,000 m<sup>2</sup>.

**4. Financial sources.**

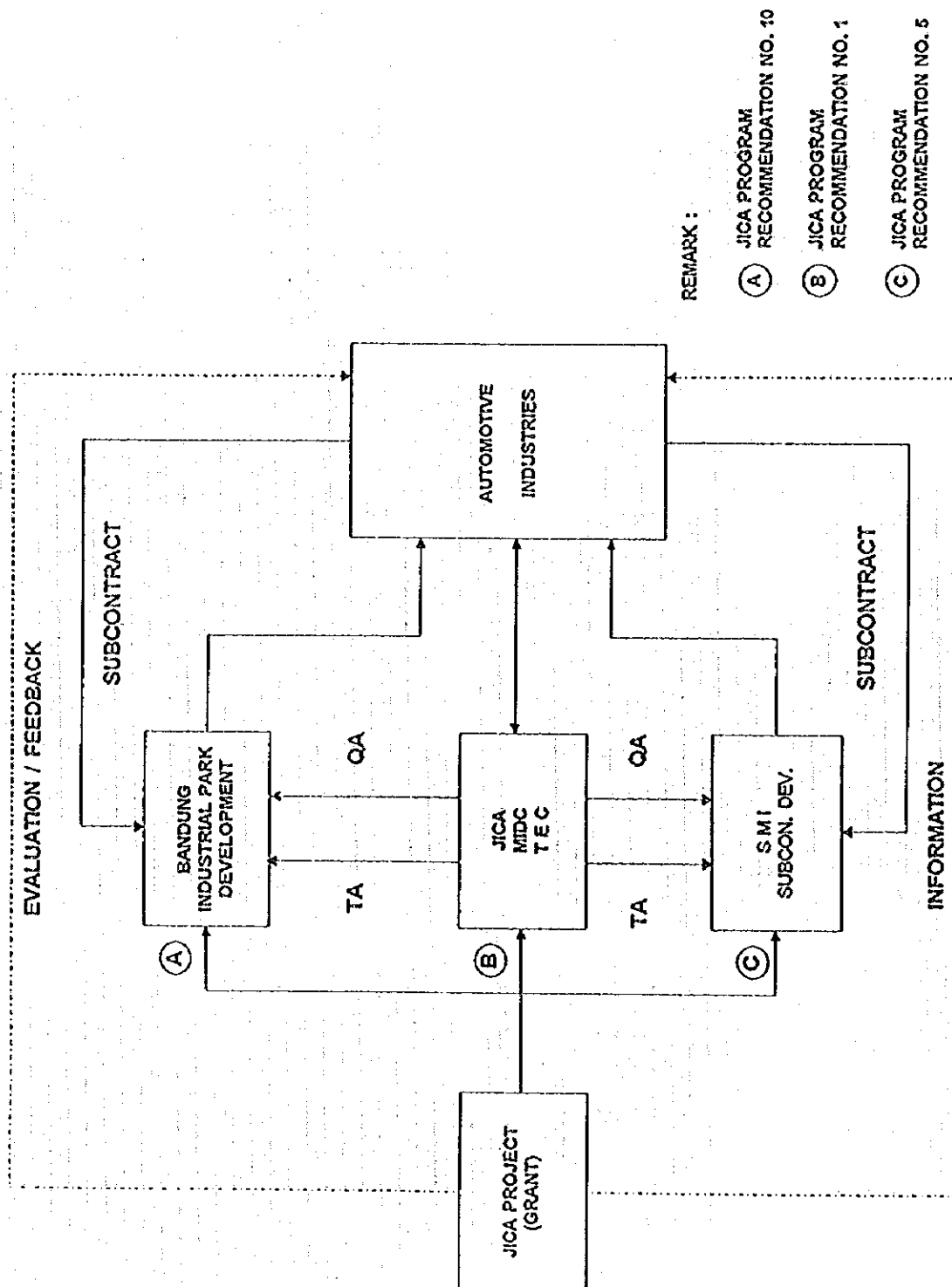
Financial support for establishment of Foundry and Machining Centre and restructuring of some potential foundries in Ceper will be provided by soft loan from Islamic Development Bank (IDB) and other financial sources.

**VII. ACTION PLAN OF JICA.**

The action plan of JICA project consisting among others :

1. Bilateral spesific agreement
2. Grant disbursement
3. JICA experts
4. Overseas training for MIDC technical staffs
5. Procurement of equipment.
6. Etc.

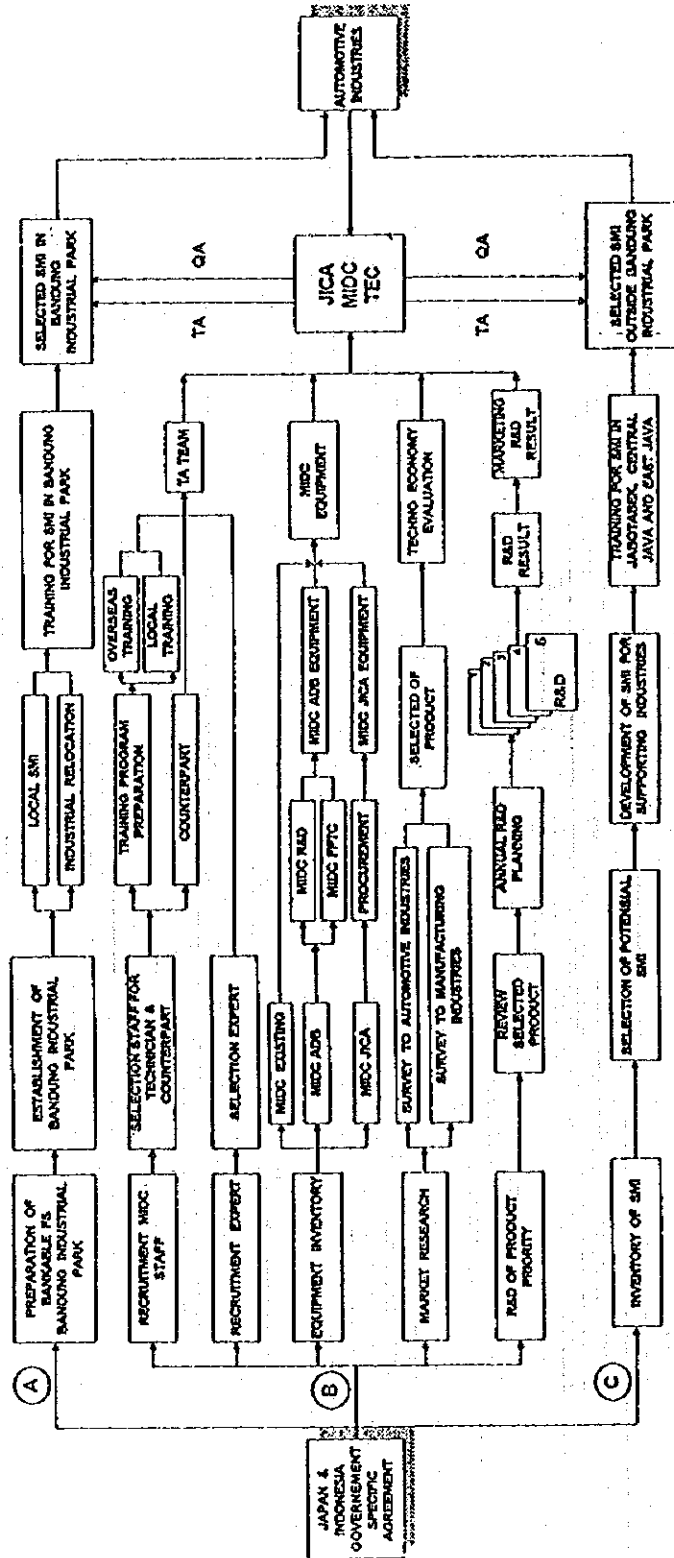
Figure 1.



DEVELOPMENT OF SUPPORTING INDUSTRIES

Figure 1.

FLOW OF ACTIVITY FOR IMPLEMENTATION OF STRENGTHENING OF IRDMMI'S TECHNICAL SUPPORT CAPABILITIES FOR THE FOUNDRY INDUSTRIES PROJECT JICA GRANT



REMARK:

- (A) JICA PROGRAM RECOMMENDATION NO. 10
- (B) JICA PROGRAM RECOMMENDATION NO. 1
- (C) JICA PROGRAM RECOMMENDATION NO. 5





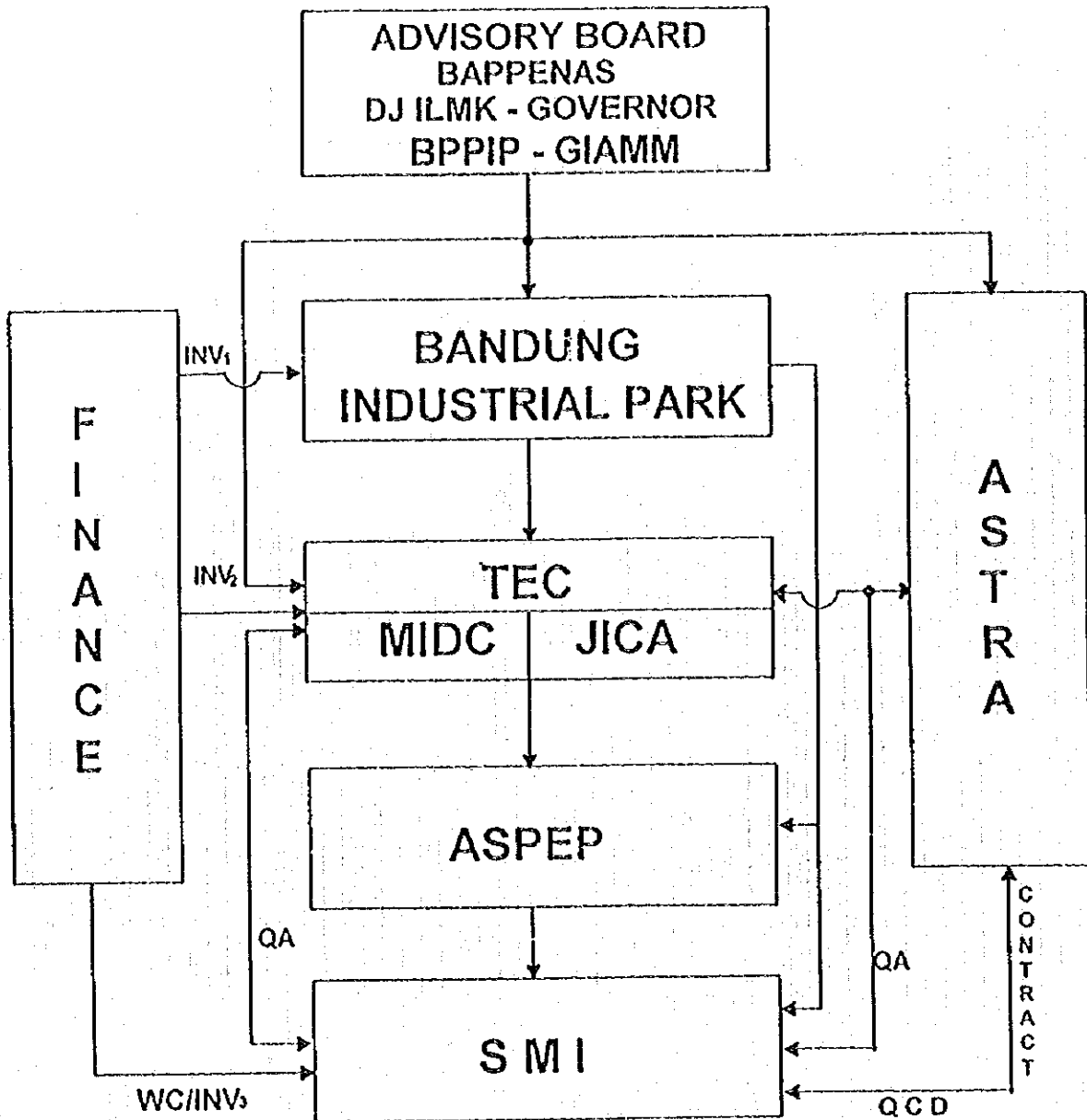
Figure 2.3

ACTION PLAN 1997 / 1998 OF JICA - MIDC PROJECT FOR RECOMMENDATION NO. 1

NO	ACTIVITIES	TARGET	RESPONSIBLE PERSON/INSTITUTION	SCHEDULE 1997 / 1998													
				1	2	3	4	5	6	7	8	9	10	11	12		
	pilot project	and die casting product															
8.1	Inventory of automotive component																
8.2	Survey to automotive industries and automotive component manufacture																
8.3	Report																
9	Inventory of MIDC equipment	Inventory of equipment	TA Team														
9.1	Inventory of existing equipment																
9.2	Review of AOB plan for equipment																
9.3	Study the additional equipment required for MIDC - JICA project																
9.4	Report																
10	Preparation 1998/1999 program	Program 1998/1999	TA Team														
10.1	Review longterm program																
10.2	Review TA Team																
10.3	Review target project																
10.4	Preparation of 1998/1999 program JICA - MIDC																



Figure 3



- QA = Quality Assurance
- INV<sub>1</sub> = Bank, and other resources
- INV<sub>2</sub> = APBN, ADB, IDB
- INV<sub>3</sub> = IDB
- WC = Working Capital from Bank
- TEC = Technical and Engineering Centre

**QUESTIONNAIRE TO IRDMMI**  
**JICA PROJECT TYPE TECHNICAL COOPERATION ON ADVISORY**  
**ASSISTANCE TO SMALL AND MEDIUM SCALE OF METAL WORKING**  
**INDUSTRY IN INDONESIA (TENTATIVE TITLE)**

**1. The present situation and future prospect on metal industry in Indonesia**

**1.1. Present situation and future prospect of foundry industry in Indonesia.**

**a. The number of foundry factories approximately are :**

- small size : 370 factories
- medium size : 158 factories
- large size : 19 factories

**b. Market demand from domestic industry.**

The following list is the projected demand of the quality casting components divided in 15 groups' products (the non standard casting products and the casting component for textile machinery are not included)

NO.	CASTING COMPONENTS	1997	1998	1999	Ton 2000
1.	AUTOMOTIVE	115.705	127.276	140.004	154.005
2.	ELECTRICAL	2.859	3.145	3.460	3.806
3.	DIESEL	5.739	6.313	6.944	7.639
4.	CIVIL WORK	703	773	850	935
5.	PUMP	3.028	3.331	3.664	4.031
6.	AGRICULTURE	161	177	195	214
7.	ROLLING STOCK	1.597	1.757	1.933	2.127
8.	DIES	1.677	1.845	2.030	2.233
9.	COUNTERWEIGHT	3.354	3.690	4.060	4.466
10.	SUGAR MILL	832	915	1.006	1.107
11.	SHIPYARD	474	521	573	629
12.	BEARING HOUSING	2.603	2.864	3.151	3.467
13.	VALVE	1.331	1.464	1.610	1.771
14.	PIPE FITTING	532	586	645	711
15.	MOTORCYCLE	2.316	2.548	2.803	3.084
	<b>TOTAL</b>	<b>142.911</b>	<b>157.205</b>	<b>172.929</b>	<b>190.225</b>

- c. In 1995, the need of casting components was 345.932 ton (including general casting) where the capacity of domestic foundries was approximately 107.000 ton. This means the share of domestic foundry was some of 31 %.**

**1.2. The MOIT of RI has emphasized to develop the following industries:**

- a. Resource based industry
- b. Labour intensive industry
- c. Technology based industry

The metal industry is one of the technology based industry (c). A particular of the metal industry policy is focused on the import substitution commodities including automotive component, industrial pump, wear resistance components as well as export expansion/boost of export

The problems faced in conducting of the policies :

- a. The majority of foundry companies are concentrated in small scale with low technology, less productivity and inefficiency.
- b. The education background of labours is mostly from low education or uneducated labour.
- c. The production capacity of the domestic foundry is lower than the demand.

1.3. The need of manpower (mp) in metal industrial sector average per year, based on the calculated annual growth of the metal industry in 1995, is

a. Foundry	1.151 persons
b. Fabrication and construction	14.153 persons
c. Precision mach. comp. industry	4.278 persons
d. Tool & Dies industry	465 persons

1.4. There are some educational and training facilities for foundry technology :

- a. IRDMMI in Bandung
- b. Politeknik Manufaktur (Polman) in Bandung
- c. BBG (Bakri, Bukaka, Guna Nusa) Foundation in Jakarta, using BakrieTosan Jaya facilities
- d. Wijaya Karya (WiKa) in Jatiwangi, West Jawa.

## 2. IRDMMI.

2.1. Function and Roles of IRDMMI.

a. Mission.

- as an agent of development for R&D in manufacturing industries
- to provide innovative product and services in problem solving of customer

b. Scope of activities/services.

There are 3 major scopes of activity :

- R&D and product development
- Training programme
- Technical and engineering services such as consultation, supervision, maintenance, standardization, testing, calibration, CAD/CAM etc.

c. Activities/services actually are conducted and currently emphasized on :

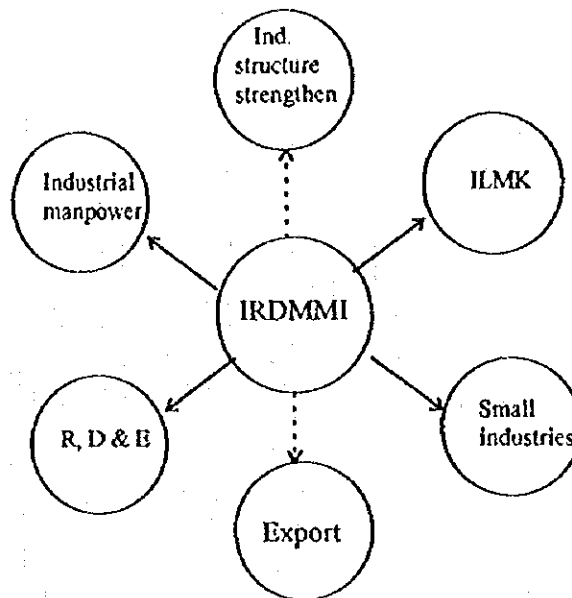
- R&D funded by government budget (Routine and development budget)
- Calibration services

d. Relationship to private sector or local industries.

The expected transfer of technology will through from :

- Specific R&D
- Manpower training
- Seminar
- Publication
- Technical and engineering services

Generally the relationship between IRDMMI and private sector or local industries can be drawn as shown below :

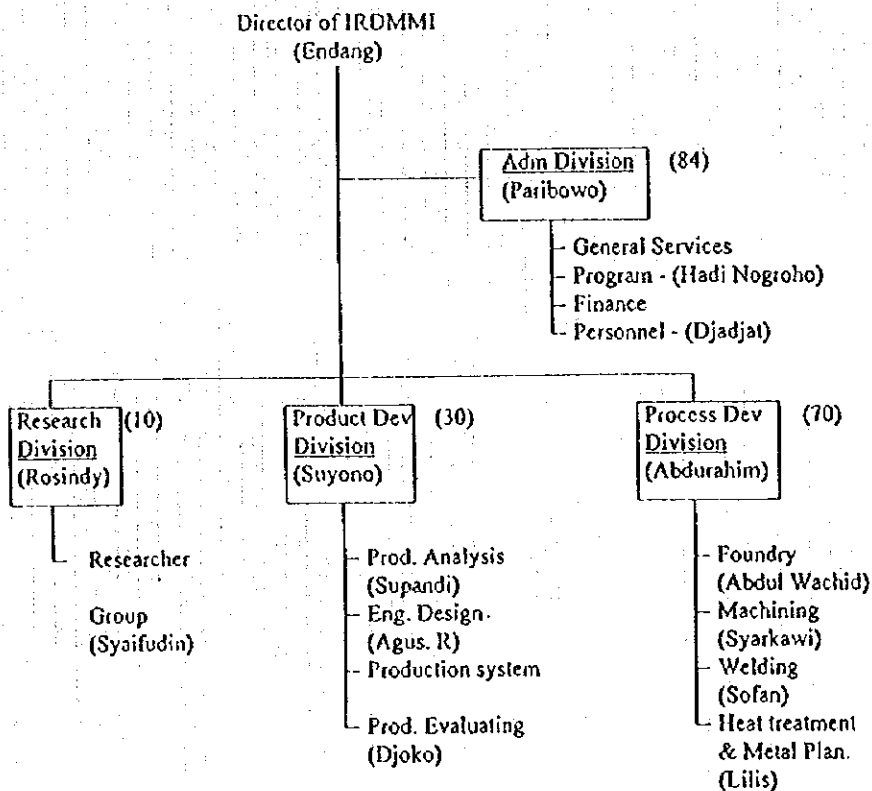


→ direct relationship

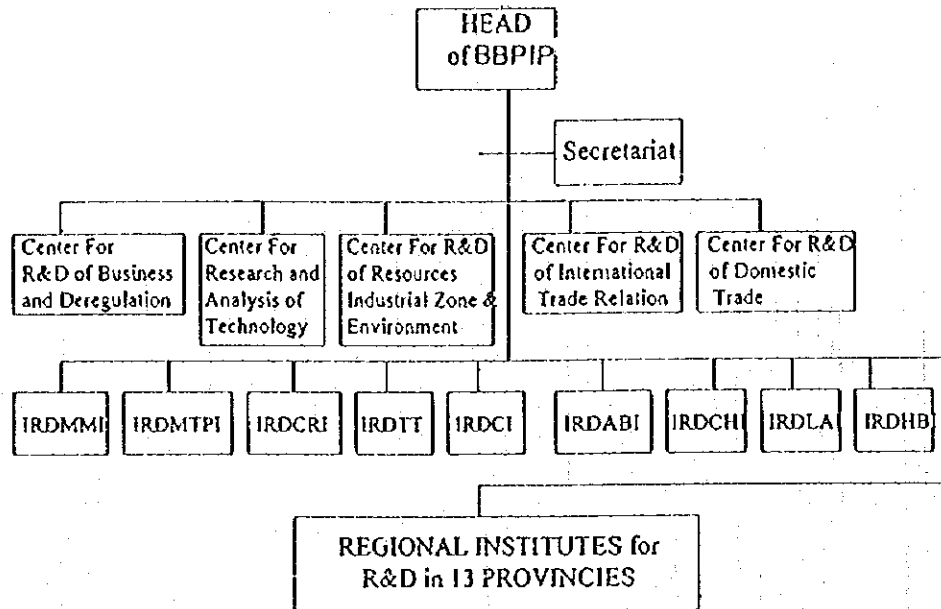
--> indirect relationship

Here, it is obvious IRDMMI has an direct relationship with private sectors particularly with small and medium scale industries as shown above. The relationship mainly through R & D, training and technical services.

e. Latest organization chart of IRDMMI.



f. Latest organization of AIRD of MOIT



- IRDMMI : Institute for R&D of Metals and Machinery Industry
- IRDMTPI : Institute for R&D of Materials and Technical Products Industry
- IRDCRI : Institute for R&D of Ceramic Industry
- IRDTT : Institute for R&D of Textile Industry
- IRDCI : Institute for R&D of Cellulose Industry
- IRDABI : Institute for R&D of Agro-based Industry
- IRDCHI : Institute for R&D of Chemical Industry
- IRDLA : Institute for R&D of Leather and Allied Industry
- IRDHI : Institute for R&D of Handicraft and Batik Industry

g. Latest list of existing machineries and equipment (see Appendix 1)

The comment on the machineries and equipment status :

Most of the machines and equipment, except for calibration laboratory, had been granted by the Kingdom of Belgium under agreement between Indonesia and Belgium Government. The machines had been installed in several phases since 1972. Although several machines are still in good condition, however, the current condition of some machines particularly in foundry, machining and welding laboratory, have employed more than 20 years. This means they are not working well and not precise as well. In addition, some of them, which have small capacity, can not works to manufacture a proper size product or prototype for R & D activity. For example, the capacity of the induction furnace in foundry is 50 kg of molten iron. Thus the machine can only fabricate maximum about 40 kg as-cast product.

h. The ISO 9000.

IRDMMI has not requested the ISO 9000, but the implementations of ISO guide 25 for calibration laboratory have been conducted since 1992. Other testing machines, such as mechanical testing, NDT, metallography and chemical testing, are still in preparation for accreditation by KAN.

2.2. Basic Information on Human Resources of IRDMMI :

a. Number of personnel : 204 persons.

b. Number of management staffs, technical and administrative staffs :

No.	Staff	Number of staff
1.	Management staff : - Head of Divisions - Head of Sections	4 12
2.	Technical staff	98
3.	Administrative staff	89

c. Salary standard in comparison to the private corporations :

No.	Level of Employee	Salary (Rp)	
		Government	Private Corp.
1.	Operator	140.000	> 250.000
2.	Supervisor	192.900	> 400.000
3.	Engineer	198,400	> 750.000

d. Average working years per staff :

No.	Average Working Staff	Number of Person	Percentage
1.	0 - 8	23	11.25
2.	9 - 16	105	51.50
3.	17 - 27	76	37.25

e. Number, list, educational background and level of schooling of counterparts assigned to the PROJECT :

No.	Major Field	Number of Counterpart	Educational Background and Level of Schooling
1.	Pattern making	2 persons : - Dedi Supriatna  - Rachmat	Senior Technical High School (STM) STM
2.	Moulding Technology	2 persons : - Nuryantoro  - Boimin	Senior Chemical High School Senior Technical High School
3.	Casting design and casting defect analyses (engineering level)	2 persons : - Ir. Tatang - Achmad	Metallurgist, Graduate Senior Technical High School
4.	Foundry metallurgy	2 persons : - Ir. Dadang Supriatna - Agus Hermawan	Metallurgist, Graduate Metallurgist, Bachelor
5.	Dies Casting	3 persons : - Ir. Rosidy - Ir. A. Syaifudin, M.Eng - DR. Ir. A. Wahid, MSc	Metallurgist, Graduate Material, Post Graduate Metallurgist, Ph.D.
6.	Die making for die casting	2 persons : - Amas Sumandang -	Senior Technical High School
7.	Product development and design	2 persons : - Encu Sumantha B.Sc. - Ir. Lilis Yuliasetiawati	Mechanical, Graduate Metallurgist, Graduate
8.	Die design	Two persons : - Drs. Firman	Material, Graduate
9.	Acessor for Qs-9000 Certified by Japanese Institute	4 persons : (tentative)	
10.	Product and performance testing	2 persons : (tentative)	
11.	Machining	3 persons : - Drs. Syarkawi - Ir, Joko Subagyo - Ir. Agus R. MM	Mechanical, Graduate Mechanical, Graduate Mechanical, Master
	Number of persons	26 persons	

**f. Plan for recruiting new staff for the PROJECT :**

IRDMMI will recruit 4 metallurgical engineers as new staff, 2 persons for Die Casting, 1 person for Foundry and 1 person for pattern making.

**2.3. The Information of The Budget of IRDMMI :**

**a. The routine budget in the last three years :**

No.	Budget	Value of Budget (Rp)		
		94/95	95/96	96/97
1.	Routine	1.179.250.000	1.337.254.000	1.507.975.000

**b. Development budget to be specially allocated for the PROJECT in the fiscal year 97/98 : Rp 174.704.000,-**

**c. Funding Sources :**

- Governmental budget :
  - 1). Routine budget
  - 2). Development budget
- Private sector
- Soft loan
- Grant

**d. Budget allocation schedule and flow from the funding sources/agency :**

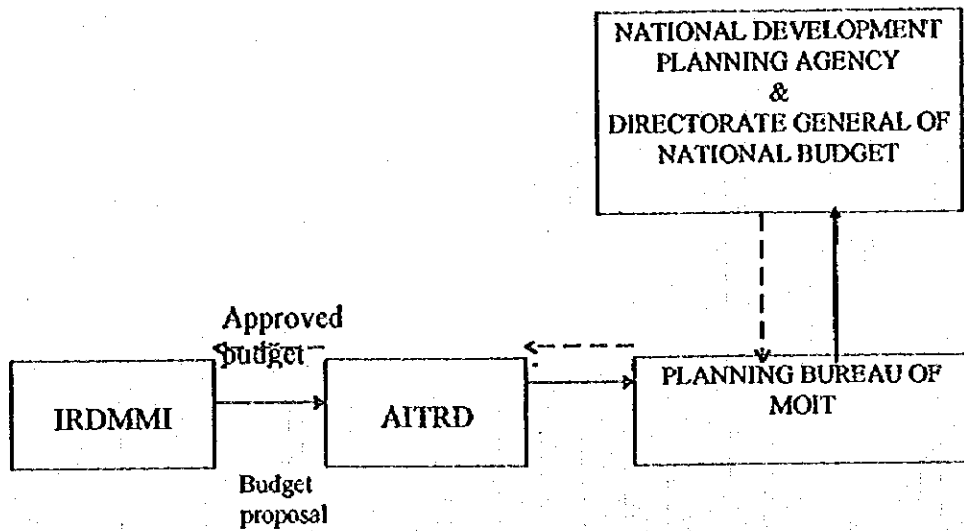
**Estimation of Development Budget allocation schedule**

97/98	Rp. 180 millions
98/99	Rp. 320 millions
99/00	Rp. 500 millions
00/01	Rp. 600 millions
01/02	<u>Rp. 400 millions</u>
Total	Rp 2.000 millions

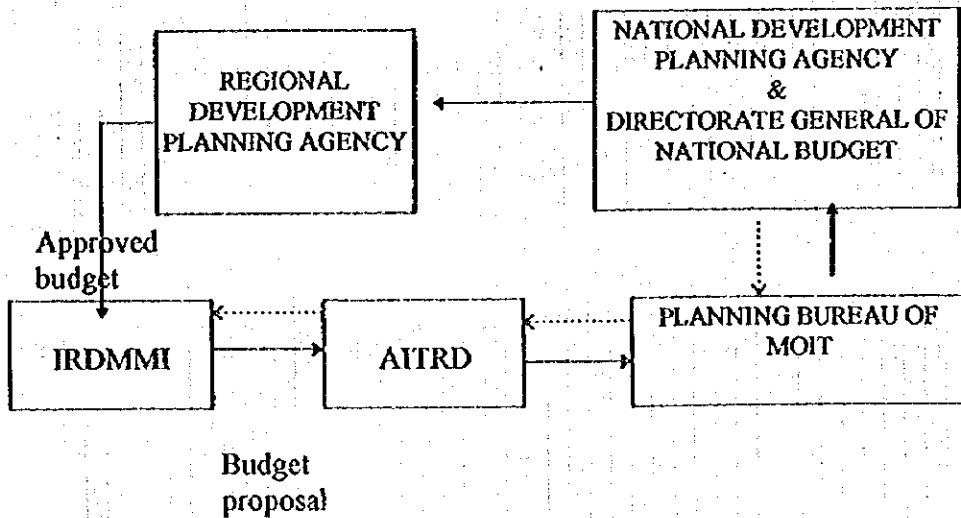


c. Relationship with the financing agency :

1). Routine Budget



2). Development Budget :



### **3. Concept on the Proposed Project**

- 3.1. Master Plan of IRDMMI covers the development of product and manufacturing technology mastery to support metal and machinery industries, mainly for small and medium scale industries. Here, the development will disseminate through R&D, training, and technical services to improve product quality and productivity. The development of technology mastery at IRDMMI covers the following: Assistance of JICA Project is the complement of ADB Loan especially for Foundry Technology.
- 3.2. The Project of JICA's Assistance is absolutely needed to develop the capability of MIDC in manufacturing automotive casting components. The manufacturing program of automotive casting components requires the mastery of specific casting technology as the materials and complicated forms need high performance. In addition it requires equipment addition not supplied by the assistance of ADB Loan. The automotive casting components are urgently needed to fill the local demand. The role of supporting industries should a priority, so that the need of import can be decreased.
- 3.3. In order to develop technology mastery at IRDMMI, the following centres are proposed to establish some divisions oriented on market and technology, i.e.:
- a. Foundry Technology Centre
  - b. Foundry Production Training Centre
  - c. Machining and Machineries Centre
  - d. Welding Technology Centre
  - e. Engineering Design and CAD/CAM Centre
  - f. Calibration and Testing Centre
- 3.4. The management of IRDMMI should be improved. Thus, IRDMMI is expected to be a Centre of Excellence of Technology. Furthermore, the Quality System, such as ISO 9000 (non contractual), should consistently be implemented. The following steps have been started to implement the Quality System, i.e.,
- a. Implementation of ISO Guide 25 for Calibration Laboratory
  - b. Preparation of ISO Guide 25 for Testing Laboratory

To improve the management capability in handling Operation of IRDMMI, a training on Management and Quality Management for the employees level III and IV is completely required.

The targets of foundry products (automotive component) through JICA's assistance are

- a. First Year
  - Flywheel
  - Exhaust Manifold
  - Brake Drum
  - Brake Disc
  - Clutch Pressure Hub
  - Clutch Pressure Plate

- b. Second Year
  - Intake Manifold (die cast)
  - Cylinder Head Core (die cast)
  - Brake Disc Caliper
  - Master Brake Cylinder
  - Brake Wheel Cylinder
- c. Third Year
  - Camshaft
  - Main Bearing Cap
  - Brake Disc Caliper (other type)
  - Brake Wheel Cylinder (other type)
  - Differential Case
  - Front Wheel Hub
- d. Fourth Year
  - Crankshaft
  - Gear Transmission Housing
  - Steering Knuckle
- e. Fifth Year
  - Cylinder Head Core (other type)
  - Engine Block

### 3.5. Target Group of the Project

#### a. Development of Foundry Technology

The development will be conducted in several metal industries centres, i.e. Ceper-Jawa Tengah; Batujajar-Jawa Barat and IRDMMI-Bandung

##### Ceper:

Manufacture of casting product with higher added value and technical support from MIDC and laboratory facilities provided by President of the Republic of Indonesia (Presidential decree).

##### Batujajar:

Manufacture of casting products (automotive components) is the implementation of R/D results (experiments) performed by IRDMMI and JICA. Foundry Production Training Centre at Batujajar will also be used as "On the Job Training Centre" for foundry operators/technicians from small and medium scale industries.

#### b. Target of Organization:

1. IRDMMI proposed foundry at IRDMMI and Batujajar to be a Centre for R/D and a Centre for Production Training Centre that can support the technological needs of industries.
2. Calibration and Testing Laboratory at IRDMMI should be developed to be a Centre for testing of automotive components.
3. Welding Technology Centre at IRDMMI will be developed to support Under Water Laboratory that can solve welding technology problems for the application of under water, cryogenic, and high temperature service.
4. Machinery center will be supported by CAD/CAM center.

**c. Target Group Priority List:**

1. Foundry : Manufacture of automotive components including pattern, development of casting material and On the Job Training for technicians from industries.
2. Machining : Manufacture of mould and die by using CNC machine and CAD/CAM
3. Testing : Product performance test of machines and automotive components.
4. Welding : Development of Welding Technology to the application of cryogenic, under water and high temperature service .

**d. Project Benefits:**

1. The mastery of product and manufacturing technology to develop small and medium scale industries in manufacturing quality and competitive products.
2. Increasing added value for the products manufactured in small and medium scale industries.
3. Stimulate investment as the technological capability of industries is improving.

**e. The Size of Target Group:**

1. Padalarang is expected as an Industrial Park with the total number of industries around 20 - 30 units in which each investment value is 2 billion - 3 billion rupiahs. Thus the total collected investment will reach 70 - 90 billion rupiahs.
2. Ceper is also expected as an Industrial Park in Central of Jawa due to the foundry and other metal industries are growing very rapidly. In addition, Ceper will going to have a metal laboratory, a pattern making shop and a modern mini foundry that funded by Indonesian Government through IRDMMI. This laboratory has been constructed since in the middle of last year.

3.6. The project of JICA's assistance has close relation with the project of ADB Loan as each project is a complement of each other and it can be seen below:

- a. Machineries and equipment of Foundry Technology Centre : JICA + ADB
- b. Expert Foundry Die Casting, Design and Quality : JICA + ADB
- c. Overseas Training Foundry, Die Casting, Design, Quality System and Product Testing: JICA + ADB

**4. Land, building and facilities.**

**4.1. Preparation of necessary space for the Project activities**

- a. Space for workshop will use the existing foundry building. This building will be renovated and some of existing equipment's will be moved to another place (metal lab, sand lab, cupola, rotary furnace etc.) Space for die casting shop will

use a building ex metal plating shop.  
b. Space for laboratory will use extension building of ex TSG and some of the area in existing foundry building.

c. For office of JICA experts will use some rooms in building ex TSG

4.2. Electrical power supply

Existing power supply 516 KVA and it will be increased up to 1 MVA

4.3. Air conditioning (AC)

The AC machines are not available in the working rooms for JICA experts. Thus the AC machines should be provided by JICA

4.4. Floor plan for the Project.

The existing foundry floor as the space for workshop will be relayout based on the program of replacement and additional equipment provided by ADB and JICA. The floor space comprises of the area for :

- pattern making,
- sand preparation,
- moulding and core making,
- ferrous melting,
- non ferrous melting,
- fettling and cleaning,
- stock materials for melting,
- stock materials for moulding,
- stock materials for pattern.

Some of floor space in extension building of ex TSG will as the space for laboratory equipment including the floor area for:

- wet chemical analysis
- rapid chemical analysis
- metallography
- sand testing
- mechanical testing

The floor plan for the project is shown on the figure in Attachment.

## 5. Transferred technology.

5.1. The technologies that should be transferred as in great demand from the target group, i.e.:

- a. Foundry Technology
- b. Die casting technology
- c. Die making technology
- d. Die design
- e. Machining technology
- f. Quality Control.
- g. Testing
- e Product development

5.2. Technologies that should be transferred by Japanese expert :

a. Foundry Technology :

- 1). Pattern making technology
  - 2). Moulding technology
  - 3). Melting technology
- b. Die casting technology
- c. Die making technology
- d. Die design
- e. Machining technology

5.3. Technology level which is appropriate in relation to sustainability.

a. Foundry Technology :

- 1). Pattern making technology
    - Pattern making for intricate shape of cast product,
    - CAD/CAM for pattern making
    - Rapid prototyping
  - 2). Moulding technology
    - High pressure green sand moulding
    - Intricate core making
  - 3). Melting technology
    - High class ductile iron
    - Austenitic ductile iron (ADI)
- b. Die casting technology
- 1). High pressure die casting
    - Cold chamber pressure die casting technology
  - 2). Low pressure die casting
  - 3). Gravity die casting
- c. Die making technology
- 1). Die making for high pressure die casting
  - 2). Die making for low pressure die casting
  - 3). Die making for gravity die casting
- d. Die design
- 1). Die design for high pressure die casting
  - 2). Die design for low pressure die casting
  - 3). Die design for gravity die casting
- e. Machining technology
- 1). Precision machining

6. Equipment and Materials

6.1. Equipment and materials required for implementation of the project.

a. Equipment

1). Existing IRDMMI equipment

1. Sand Muller
2. Water Dosage Unit
3. Additive Dosage (Bentonite, Coal Powder)
4. New Sand Dosage Unit
5. Airater

6. Sand Conveying System
7. New Sand Hopper
8. Control Panel for System
9. Magnetic Separator
10. Sand Silo
11. Sand Conveying System
12. Control Panel for System
13. Transformer / Power Station
14. Water Supply
15. Sand Casting Equipment

**2) Equipment provided from ADB**

1. Induction Furnace, 250 Kgs
2. Geared Pouring Ladle
3. Geared Mg Treatment Ladle
4. Ladle Heater
5. Balance for Charging Material
6. Crane Balance
7. Hi Press, Blow Squeeze Moulding Machine
8. Bottom Board
9. Mould Weight
10. Pallet Car
11. Sand Conveying System
12. Dust Collector and Ducting
13. Control Panel for System
14. Shell Core Machine
15. Core Blower
16. Core Sand Mixer
17. Cut Off Machine
18. Grinding Machine
19. Forklift
20. Overhead Crane
21. Air Compressor
22. Cold Chamber Pressure Die Casting
23. Electric Resistance Furnace
24. Pyrometer
25. CE Meter
26. Nodularity Detector
27. Spectrometer
28. Hardness Tester
29. Tensile Strength Tester
30. Charpy Tester
31. Metallography

**3) Equipment provided By JICA**

1. Furnace Dust/Smoke Collector Unit & Ducting
2. Mould Jacket
3. Pallet Railing

4. sand Muller
5. Water Dosage Unit
6. Aerator
7. Control Panel for System
8. Drum Cooler
9. Rotary/Vibrating Screen
10. Dust Collector & Ducting
11. Shell Core Machine
12. Apron Type Shot Blast Machine
13. Liquid Metal Transfer Unit
14. Extractor Unit
15. Spray Unit
16. Trimming Test
17. C & S Determinator
18. Performance Test Equipment
19. Sand Cooler

b. Materials required for implementation of Project.

NO	MATERIALS
1	steel scrap cold rolled
2	sorel metal
3	carburizer
4	inoculant
5	FeSiMg
6	CE cup
7	Nod cup
8	Pyro cap
9	ramming mix
10	refractory cement
11	silica sand grade A
12	silica sand grade B
13	bentonite
14	coal dust
15	parting powder
16	resin coated sand
17	gas LPG
18	steel shot
19	grinding wheel
20	cutting wheel
21	argon gas
22	alumina paste
23	mounting mat'l
24	ceramic boot
25	polishing paper
26	film
27	chemical



- 28 teak wood
- 29 multiplex
- 30 filler
- 31 polishing paper
- 32 paint
- 33 epoxy resin
- 34 araldite
- 35 others

6.2. IRDMMI budget cover the installation cost and operational cost, but for maintenance cost of equipment should be provided by JICA

6.3 We can not assign operation staffs as maintenance staffs because it is different job and different persons.

## 7. Others

7.1 Office hour : 07.30 - 16.00

**DIVISION OF FOUNDRY  
AND  
FOUNDRY TRAINING CENTRE**

**2. MACHINERY & EQUIPMENT DEVELOPMENT FOR FOUNDRY DIVISION AND  
FOUNDRY PRODUCTION TRAINING CENTRE**

EXISTING				DEVELOPMENT PROGRAMME			
No.	Machinery & Equipment	Qty	Year	No.	Machinery & Equipment	Qty	Year
1	2	3	4	5	6	7	8
A.	TECHNOLOGY SERVICES CENTRE						
1.	Pattern Making	9 unit	1970	1.	CNC Pattern Copy Milling	1 unit	1998/1999
2.	Sand Preparation	16 unit	1970	2.	Rapid Prototyping	1 unit	1998/1999
3.	Moulding	5 unit	1970	3.	Three Coord. Measuring	1 unit	1998/1999
4.	Melting	5 unit	1970	4.	Continuous Mixer	1 unit	1998/1999
5.	Sand Lab	1 unit	1970	5.	Rotary Screen	1 unit	1998/1999
6.	Metal Lab.	1 unit	1970	6.	Dust Collector	1 unit	1998/1999
				7.	Blow Squeeze Moulding Mach	1 unit	1998/1999
				8.	Equipments for Blow Squeeze Moulding M. Line	1 unit	1998/1999
				9.	Induction Fce 500 Kg	1 unit	1998/1999
				10.	Sintering Furnace	1 unit	1998/1999
				11.	Dilatometer	1 unit	1998/1999
				12.	Channel Spectrometer for Al.	10 ch	1998/1999
				13.	Electric Annealing fce	1 unit	1998/1999
				14.	Hot Chamber Die Casting	1 unit	1998/1999
				15.	Cold Chamber Die Casting	1 unit	1998/1999
				16.	Low Pressure Die Casting	1 unit	1998/1999
				17.	Gravity Die Casting	1 unit	1998/1999
B.	FOUNDRY PRODUCTION TRAINING CENTRE						
					MELTING		
				1.	Induction Fce 1000 kg	1 unit	1999/2000
				2.	Hot blast cupola 1500 kg/h	1 unit	1999/2000
				3.	Pouring ladle 1000 kg	1 unit	1999/2000
				4.	Pouring ladle 500 kg	2 unit	1999/2000
				5.	Pouring ladle 200 kg	2 unit	1999/2000
				6.	Mg-treatment ladle 500 kg	1 unit	1999/2000
				7.	Ladle heater	1 unit	1999/2000
				8.	Crane balance	1 unit	1999/2000

1	2	3	4	5	6	7	8
				9. Pouring crane 10. Thermocouple 11. CE-meter 12. Nod. detector		1 unit 1 unit 1 unit 1 unit	1999/2000 1999/2000 1999/2000 1999/2000
				<b>MOULDING &amp; CORE MAKING</b>			
				2. Machine S FD2 3. Moulding machine S FD3 4. Moulding flask FL- 5. Moulding flask FD3 6. Moulding flask FD4 7. Roller conveyor 8. Bottom board 9. Mould weight 10. Mould lift crane 11. Screw compresor 12. Shell core machine		4 unit 4 unit 2 unit 30 set 50 set 30 set 90 set 50 pcs 30 pcs 8 unit 1 unit 1 unit	1999/2000 1999/2000 1999/2000 1999/2000 1999/2000 1999/2000 1999/2000 1999/2000 1999/2000 1999/2000 1999/2000 1999/2000
				<b>SAND RECLAMATION SYSTEM</b>			
				1. Shake out machine 2. Underground BC 3. Transition BC 4. Magnetic sparator 5. Rotary breaker screen 6. BC from rotary screen 7. Sand cooler 8. BC from sand cooler 9. Bucket elevator 10. Sand silo 11. Dust collector 12. Control panel		1 unit 1 unit 1 unit 1 unit 1 unit 1 unit 1 unit 1 unit 1 unit 2 unit 2 unit	1999/2000 1999/2000 1999/2000 1999/2000 1999/2000 1999/2000 1999/2000 1999/2000 1999/2000 1999/2000 1999/2000

1	2	3	4	5	6	7	8
					<b>SAND PREPARATION SYSTEM</b>		
				1.	Belt feeder from silo	1 unit	1999/2000
				2.	Belt feeder from new sand hopper	1 unit	1999/2000
				3.	New sand hopper	1 unit	1999/2000
				4.	Additive hopper & feeder	3 unit	1999/2000
				5.	Slip host bucket	1 unit	1999/2000
				6.	Turbo mixer	1 unit	1999/2000
				7.	Structure for mixer	1 unit	1999/2000
				8.	Water dosage unit	1 unit	1999/2000
				9.	Airater	1 unit	1999/2000
				10.	Overhead BC	1 unit	1999/2000
				11.	Ready sand hopper	10 unit	1999/2000
				12.	Structure ready sand hopper	1 unit	1999/2000
				13.	Control panel	2 unit	1999/2000
					<b>FETTLING &amp; CLEANING</b>		
				1.	Shot blast machine	1 unit	1999/2000
				2.	Grinding machine	4 unit	1999/2000
				3.	Cut off machine	2 unit	1999/2000
					<b>HANDLING</b>		
				1.	Forklift	2 unit	1999/2000
				2.	Handcart	8 unit	1999/2000
					<b>METAL CONTROL</b>		
				1.	Spectrometer	1 unit	1999/2000
				2.	Metalography microscope	1 unit	1999/2000
				3.	Hardness tester	1 unit	1999/2000
					<b>SAND CONTROL</b>		
				1.	Moisture tester	1 unit	1999/2000
				2.	Hardness tester	2 unit	1999/2000
				3.	Permeability tester	1 unit	1999/2000
				4.	Green strength tester	1 unit	1999/2000
				5.	Methylene blue tester	1 unit	1999/2000
				6.	Sand rammer	1 unit	1999/2000
				7.	Sieve analysis	1 unit	1999/2000
				8.	Clay washer	1 unit	1999/2000
				9.	Microscope	1 unit	1999/2000

## II. HUMAN RESOURCES DEVELOPMENT

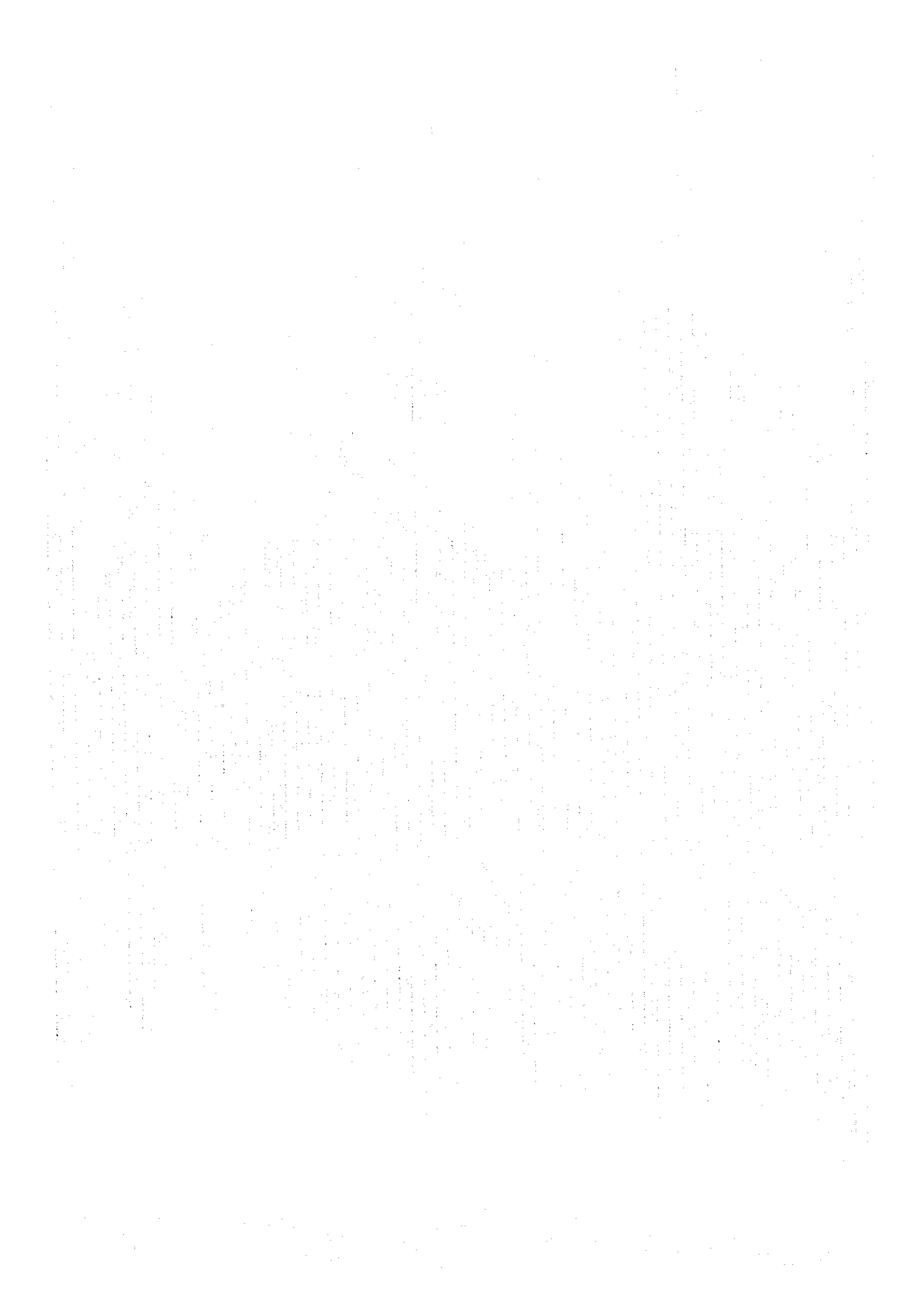
EXISTING		DEVELOPMENT PROGRAMME						Total	
No.	Qualification	Qty	No.	Qualification	97/98	98/99	99/00	00/01	
1.	S3 Metallurgy	1	1.	S3 Metallurgy	-	-	-	1	1
2.	S2 Metallurgy	-	2.	S2 Metallurgy	-	1	1	2	4
3.	S1 Metallurgy	3	3.	S1 Metallurgy	1	2	3	3	9
4.	D3 Technical	2	4.	D3 Technical	1	1	-	-	2
5.	Senior High School	18	5.	Senior High School	3	3	3	3	12
6.	Yunior High School	4	6.	Yunior High School	-	-	-	-	-

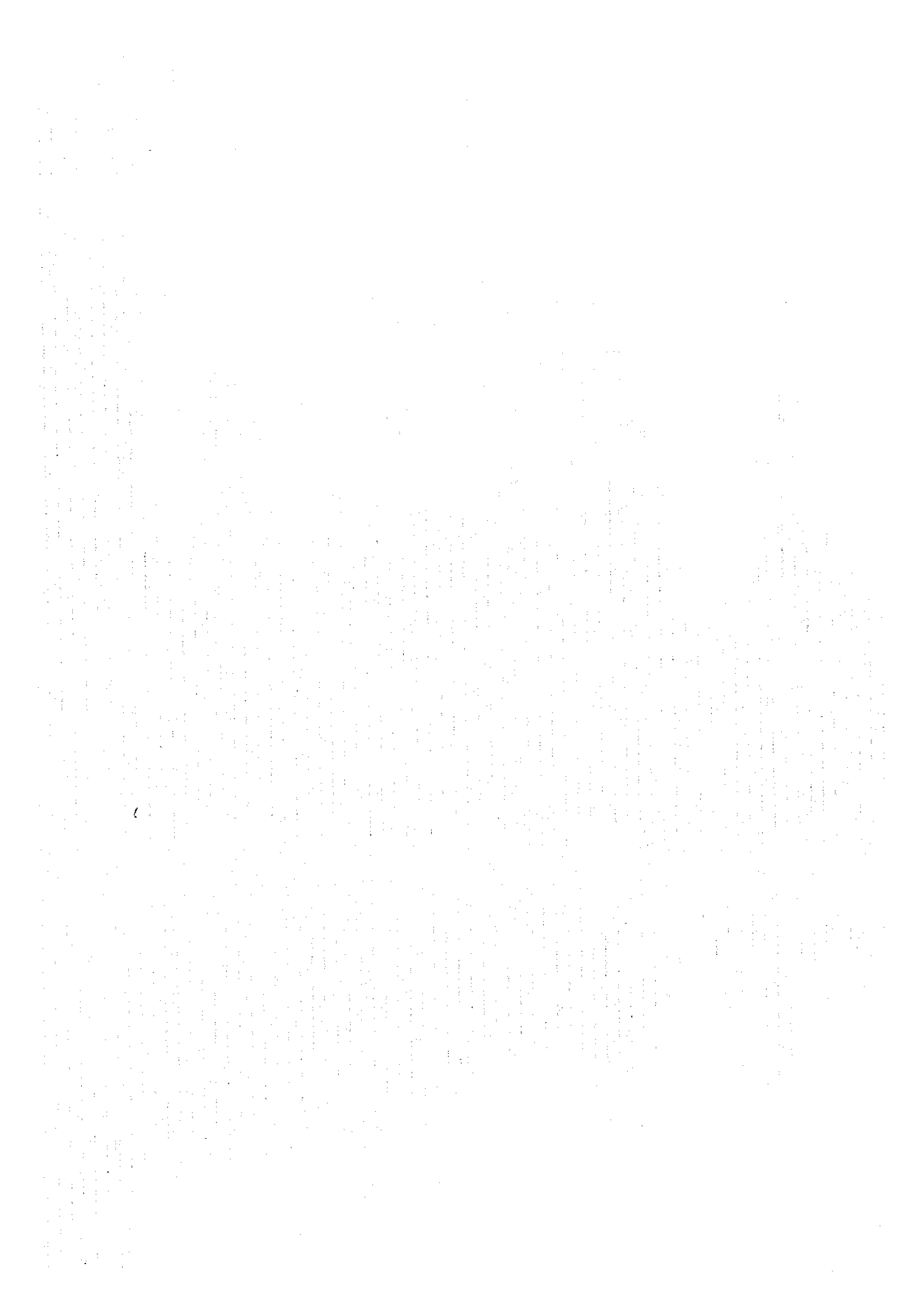
### III. SERVICES ACTIVITY

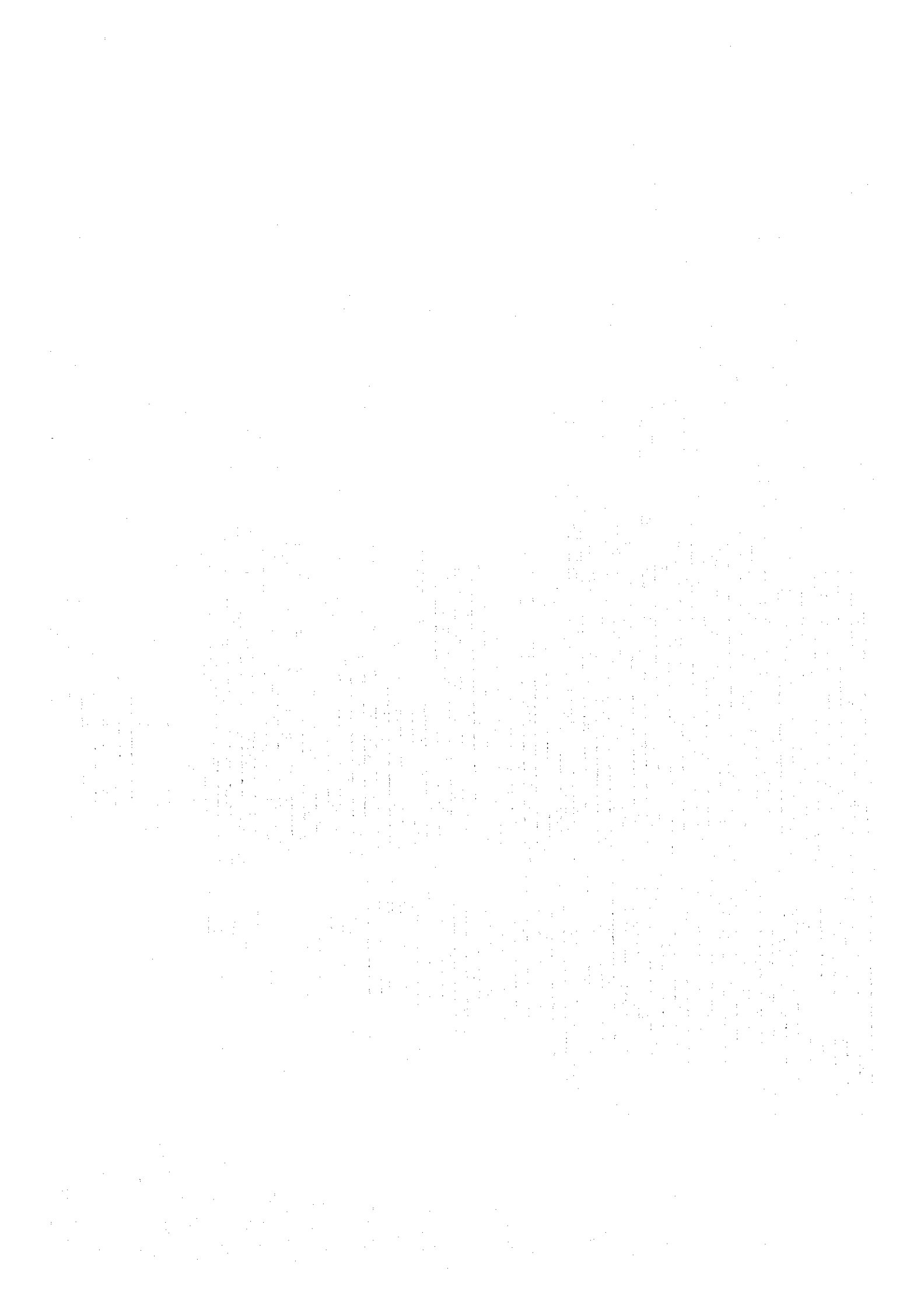
No.	EXISTING	VALUE	No.	DEVELOPMENT PROGRAMME (2005)	VALUE (Projection)
1.	Applied R & D	510,000,000	1.	Applied R & D	50,000,000
2.	Training	25,000,000		- Cast materials	50,000,000
3.	Consultation	40,000,000		- Foundry Process	40,000,000
				- Foundry Engineering	50,000,000
				- Die Casting	
			2.	Product Development	250,000,000
				- Sand casting prototyping	375,000,000
				- Die casting prototyping	
			3.	Training	60,000,000
				- Foundry technology	60,000,000
				- Pattern making	75,000,000
				- Die casting technology	120,000,000
				- Foundry production	
			4.	Pattern Making	360,000,000
			5.	Supervision	15,000,000
			6.	Casting of FPTC	3,600,000,000
		575,000,000			5,105,000,000











JICA