#3-2 Establishment of Gauge Manufacturing Shop

- No.5 HI: #Gauge Manufacturing Shop -

(1) Details of the Plan

(For the details, see Attached Tables 1-1 and 1-2.)

The present plan is to set up the gauge production facilities at No.5 HI adjacent to the calibration center which is planned as a separate item (#2-1).

Planned annual production qualities are as follows:

	Type of Gauge	Planned Annual Production
1.	Plug gauge	1,000 pcs
2.	Ball gauge	120 pcs
3.	Snap gauge	1,000 pcs
4.	Spline gauge	120 pcs
5.	Serration gauge	120 pcs
6.	Taper gauge	120 pcs
7.	Screw plug gauge	250 pcs
8.	Screw ring gauge	250 pcs
9.	Block gauge	120 pcs
10.	Pin gauge	120 pcs
	Total	3,220 pcs

(2) Estimated Capital Requirement

1) Required Facilities

Machinery and equipment required for the plan is indicated in Attached Table 2-1.

2) The estimated capital requirement for the plan is as indicated in Attached Table 2-2.

(3) Expected Effects of the Plan

1) Saving of Foreign Exchange

In the case of the present plan not being implemented, these gauges have to be imported. Compared with the required amount of foreign exchange for import, the present plan requires more foreign exchange per year under the presently planned production level. Thus, it is hard to expect the saving of foreign exchange from the present plan as shown below.

(Unit: Million yen/year)

	Foreign Exchange (F/E) required at implementation of plan	Foreign exchange (F/E) required in case of imports
Products Costs	-	92.7
RM Costs	74.1	-
Freight & Insurance	7.0	8.8
Sub-Total	81.1	101.5
M/E Costs	140.8	-
Total	221.9	101.5

Note: For the details of above, see Attached Table 2-2. The f.o.b. prices of gauges in the case of import are assumed as follows;

(Unit: Yen)

Type of Gauge	F.O.B. Price
Plain plug gauge	8,900
Suap gauge	16,100
Screw plug gauge	15,000
Screw ring gauge	30,000
Taper gauge	126,000
Block gauge	60,000
Pin gauge	236,000

The raw materials costs for the gauge production is assumed 80% of the products costs.

If the annual production volume is increased to about 4.5 times that of the presently planned volume, the saving of foreign exchange may be expected as shown in the following.

(Unit: Million yen/year)

Annual production (Present planned production = 100)	F/E required at implementation of plan	F/E required in case of import
300	303.0	203.0
300	384.1	304.5
400	465.2	406.0
500	546.3	507.5

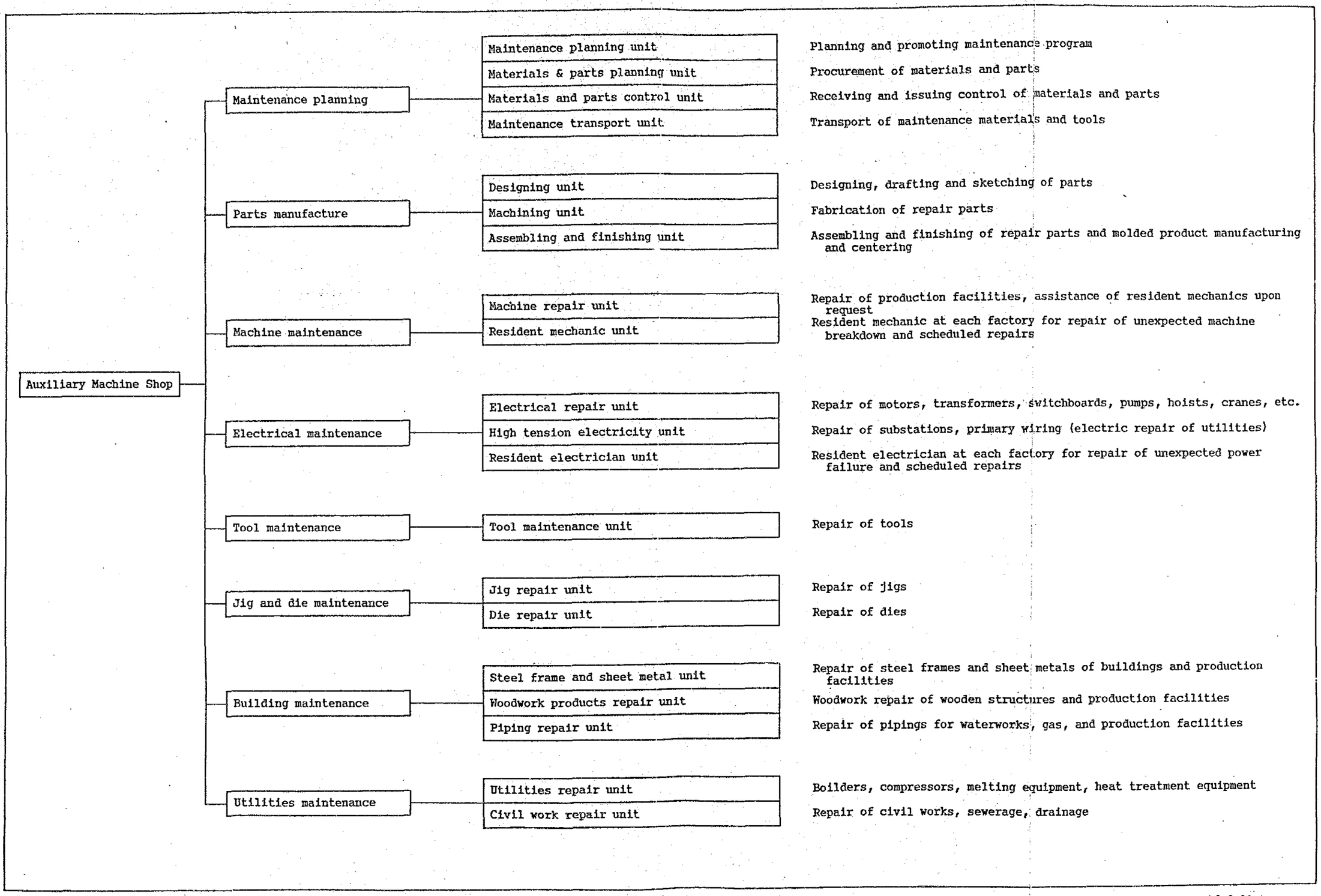
Nevertheless, the present plan is quite effective in terms of technology transfer with respect to precision machine production, being expected to contribute to improvement of quality of domestically produced parts. Therefore, it is recommended to implement the plan so long as the increase in required production volume can be anticipated to some extent in the future.

Attached Table 1-1 CONTENTS OF THE PROJECT FOR INSTALLATION OF MACHINES & EQUIPMENT FOR PRODUCTION OF GAUGES

Place of installation / Description	No. 5 HI
Building	Either utilize one of the shops within No.5 HI or construct a new building. Required area: 650 m²
Outline of machinery & equipment	Main machinery and equipment for production of gauges 1) Lathe, miller 2) Grinder 3) Electric discharge machine 4) Inspection equipment 5) Heat treatment facilities 6) Measuring instruments, repair tools 7) Other machinery & equipment 8) Other wiring and piping materials 9) One year's supply of spare parts
Technical data and technical guidance	9 persons, 51 man-months
Major components & materials	1) Gauge steel
Remarks	Note: 1) Refer to the Attached Table 1-1 Manufacturing and Repairing Processes for Each Type of Gauge. 2) It is desirable to totalize the cutting tools, dies and jigs production equipment for installation.

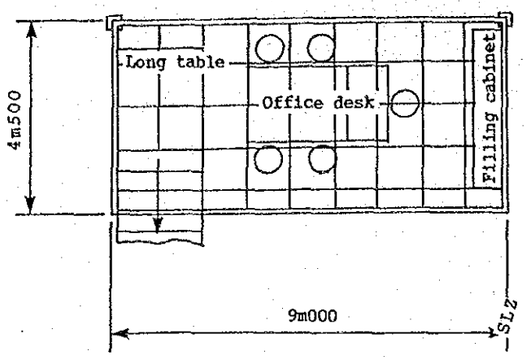
Attached Figure 1-1 FUNCTION OF AN AUXILIARY MACHINE SHOP

- for Reference -

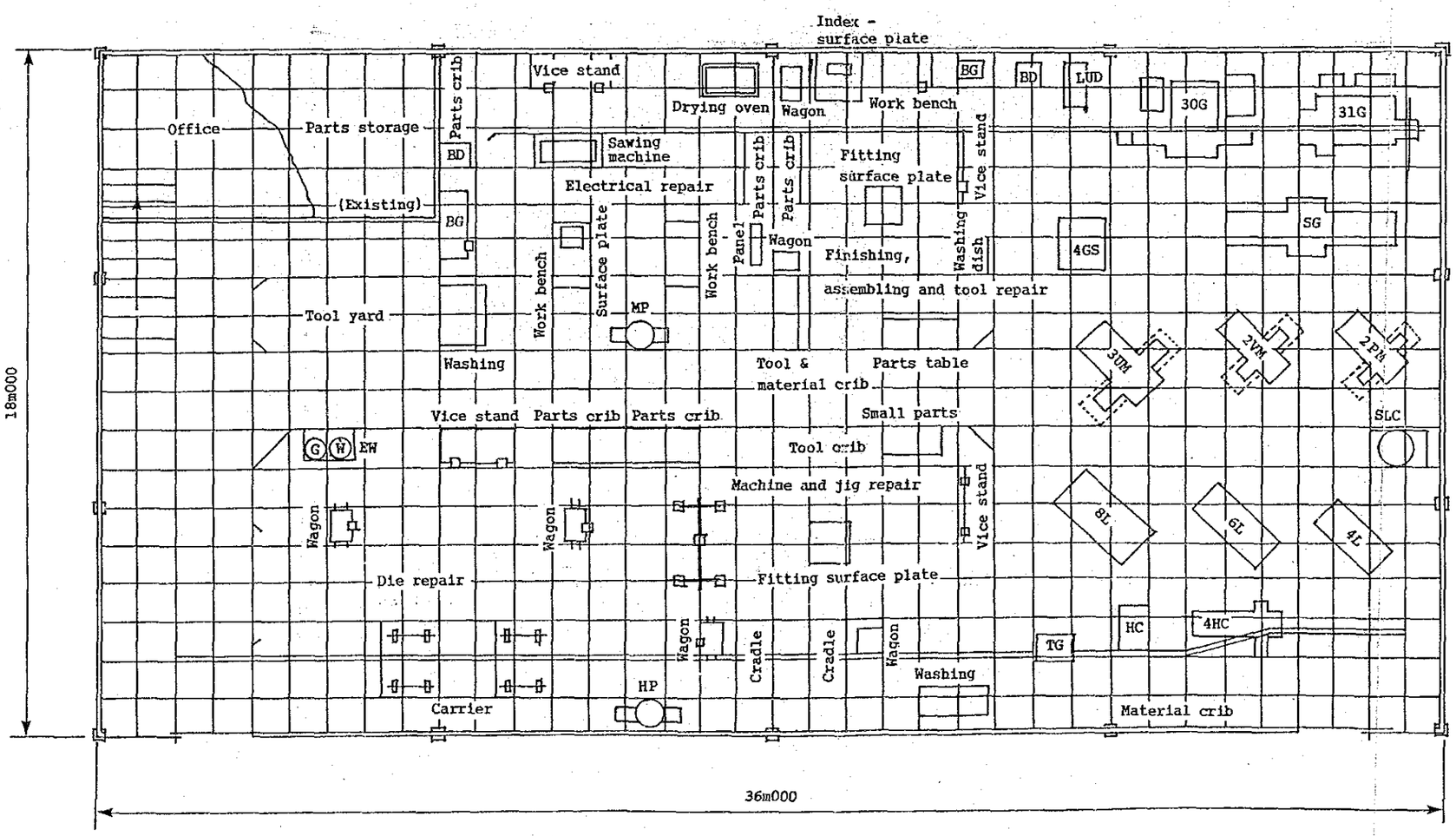


Attached Figure 1-2

Office on 2nd floor



Layout of An Auxiliary Machine Shop
- for Reference -



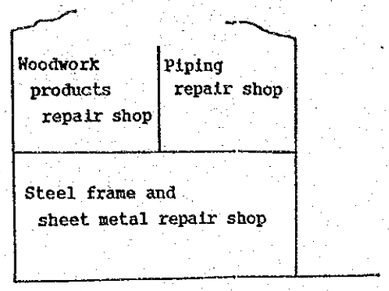
1st floor... 648 m²

Machining workshop	198 m²
Finishing, assembling, tool repair workshop	48 m²
Electrical repair workshop	72 m²
Machine and jig repair workshop	64 m²
Die repair workshop	104 m²
Parts storage	40.5 m²
Common space	121.5 m²

2nd floor... Office - 40.5 m²

Attached Figure 1-3

Layout of A Building & Utilities Maintenance Shop
- for Reference -



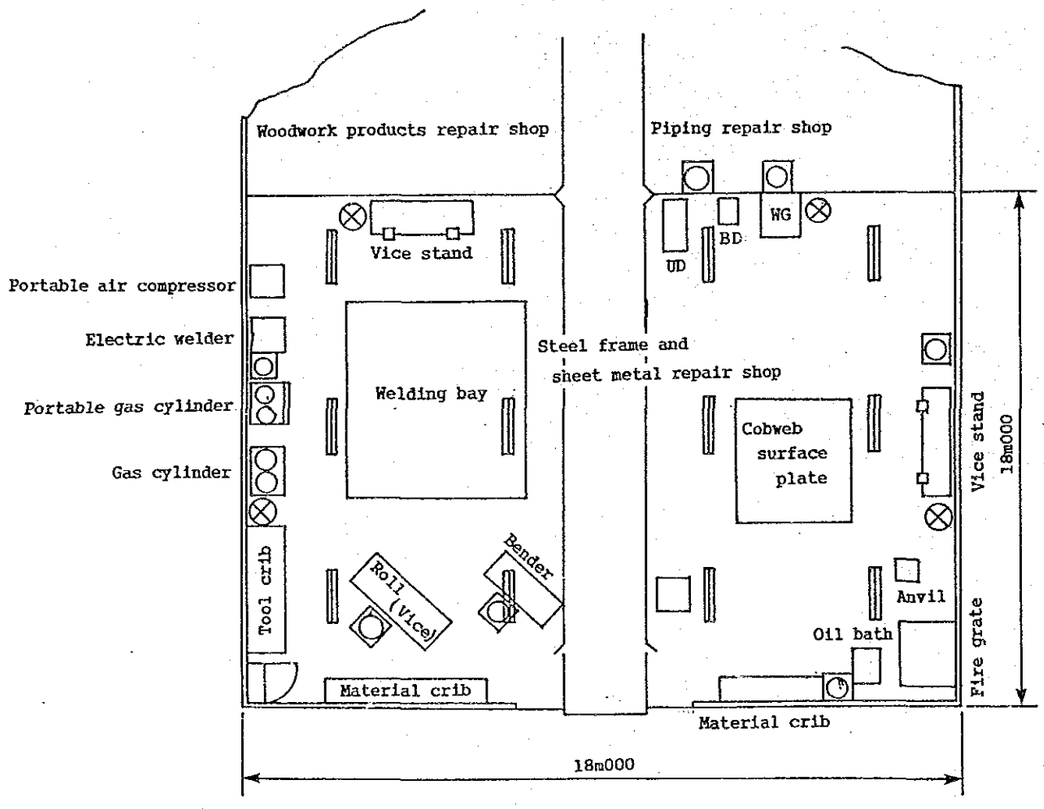
Steel Frame and Steel Metal Repair Shop

324 m²

Appurtenant works of factory

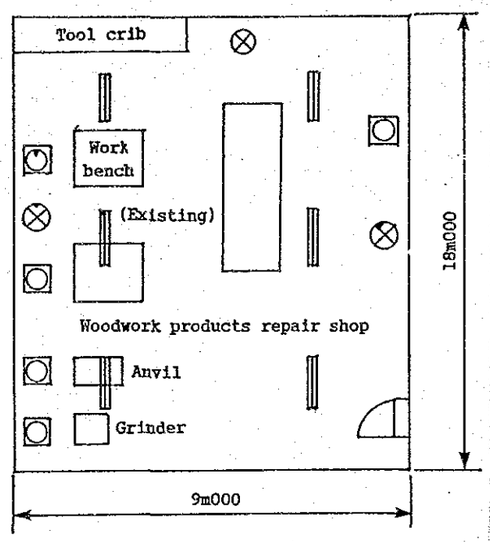
	Centralized power box, one spot
	Distribution board box, 7 spots (with plug socket)
⊗	Compressed air piping, 4 spots
	Ceiling lamp, 12 spots

Individual lamp, 4 spots



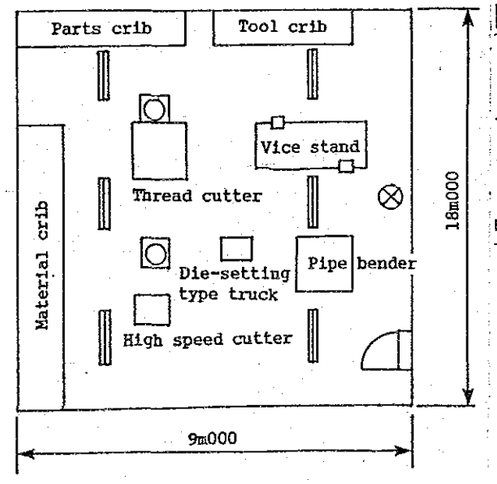
Woodwork Products Repair Shop

162 m²



Piping Repair Shop

162 m²



	Centralized power switch box, one spot
	Power — Fluorescent lamp
	Distribution board ... 5 spots
	Power — Fluorescent lamp
⊗	Compressed air piping (3/4") 3 spots (with valve)
	Fluorescent lamp, 6 spots

Works to be executed

	Centralized power switch box, one spot
	Power — Fluorescent lamp
	Distribution board, two spots
	Power — Plug socket
⊗	Compressed air piping (3/4"), one spot with valve
	Fluorescent lamp, 6 spots

Attached Table 1-2 MANUFACTURING AND REPAIRING PROCESSES FOR EACH TYPE OF GAUGE

- for Reference -

	Measuring instrument	19 Measuring instrument	18 Fitting & finishing	17 Inspection	16 Etching	15 Gauge finishing	14 Spherical grinding	13 Electrospark machining	12 Internal grinding	11 Surface grinding	10 Thread grinding	9 Tooth profile grinding	8 Outside diameter grinding	7 Heat treatment	6 Perforating	5 Milling	4 Marking-off	3 Turning	2 Material trimming	1 Cutting	Processes necessary for manufacture and repair	No. of men dispatched for technical guidance	Required period of technical guidance
Manufacture																							
1	Pin gauge			↑	↑					↑			↑	↑				↑		↑	1 Cutting		
2	Test bar			↑	↑								↑	↑				↑		↑	2 Material trimming		
3	Plug gauge			↑	↑								↑	↑				↑		↑	3 Turning		
4	Taper gauge			↑	↑								↑	↑				↑		↑	4 Marking-off	1	6
5	Taper ring gauge			↑	↑				↑	↑			↑	↑				↑		↑	5 Milling		
6	Master plug gauge			↑	↑	↑							↑	↑				↑		↑	6 Perforating		
7	Master ring gauge			↑	↑	↑			↑	↑				↑				↑			7 Heat treatment	1	6
8	Square type spline plug gauge			↑		↑				↑		↑	↑	↑		↑	↑	↑		↑	8 Outer diameter grinding		
9	Square type spline ring gauge			↑	↑	↑		↑		↑				↑	↑			↑			9 Tooth profile grinding		
10	Spline ring gauge			↑		↑				↑		↑	↑	↑		↑	↑	↑		↑	10 Thread grinding	2	12
11	Spline ring gauge			↑	↑	↑		↑		↑				↑	↑			↑			11 Surface grinding		
12	Serration plug gauge			↑		↑				↑		↑	↑	↑		↑	↑	↑		↑	12 Internal grinding		
13	Serration ring gauge			↑	↑	↑		↑		↑				↑	↑			↑			13 Electrospark machining		
14	Screw plug gauge			↑	↑						↑			↑				↑		↑	14 Spherical grinding	1	3
15	Screw ring gauge			↑	↑	↑				↑				↑				↑			15 Gauge finishing	1	12
16	Ball gauge			↑	↑		↑							↑				↑		↑	16 Etching	1	3
17	Step gauge			↑	↑	↑		↑		↑				↑					↑		17 Inspection	1	3
18	Special gauge			↑	↑	↑		↑		↑				↑					↑		18 Fitting and finishing		
19	Snap gauge			↑	↑	↑		↑		↑				↑					↑		19 Measuring instrument repair	1	6
20	Straightedge			↑	↑	↑				↑				↑					↑		Total		
21	Square			↑	↑	↑				↑				↑					↑				
22	Mass block		↑	↑												↑							
23	Surface plate		↑																				
24	Block gauge					↑																	
Repair																							
26	Micrometer	38	Pushpul gauge																				
27	Internal micrometer	39	Torque wrench																				
29	Hall tester	40	Torque driver																				
30	Height micrometer	41	Bourdon																				
31	Vernier caliper	42	Air meter																				
32	Height gauge	43	Compression gauge																				
33	Micrometer	44	Tire gauge																				
34	Dial gauge	45	Stop watch																				
35	Cylinder gauge																						
36	Dial meter																						
37	Caliper gauge																						

Repair

Attached Table 2-1 LIST OF REQUIRED FACILITIES

#: 3-2 Gauge Manufacturing
- No.5 HI: # Gauge Manufacturing Shop -

No	Items	Unit	No.
1	Bldg & Land		
A	Land		
B	Bldg		
2	Imported M/E		
1	Gauge manufacturing equiment		
1 1	Lathe and milling M/C	Set	1
1 2	Grinding M/C	Set	1
1 3	Electric discharge M/C	Set	1
1 4	Inspection equipment	Set	1
1 5	Heat treatment equipment	Set	1
1 6	Tools for repairing instruments	Lot	1
1 7	Miscellaneous	Lot	1
1 7 1	Sawing M/C	Set	2
1 7 2	Drilling M/C	Set	1
1 7 3	Air conditioning equipment	Set	1

Attached Table 2-2: REQUIRED INVESTMENT (#3-2)

(Unit: million yen)

Items			Investment		
			Foreign	Local	Total
1		Bldg & Land			
A		Land	-	0.0	0.0
B	1	Building	45.6	45.9	91.5
	2	Freight & Insurance	4.3	-	4.3
		Sub-total	49.9	45.9	95.8
	3	Import Duty	-	7.5	7.5
	4	Unloading	-	1.0	1.0
		Building Total	49.9	54.4	104.3
		Bldg & Land Total	49.9	54.4	104.3
2	1	Imported M/E (FOB)	1174.0	-	1174.0
	2	Freight & Insurance	111.5	-	111.5
		Sub-total	1285.5	-	1285.5
	3	Import Duty	-	192.9	192.9
	4	Unloading	-	25.7	25.7
	5	Installation Cost	-	4.2	4.2
		Imported M/E Total	1285.5	222.8	1508.3
3		Local M/E	-	0.0	0.0
4		Other Costs			
A		License Fee	0.0	-	0.0
B		Eng Fee	117.0	-	117.0
C		Software	0.0	-	0.0
D		Interest	0.0	-	0.0
		Other Costs Total	117.0	-	117.0
		Total Investment	1452.4	277.2	1729.6

Attached Table 2-3: PRODUCTION COST STATEMENT (#3-2)

	Items	Annual Cost (million Yen) F/C	L/C	Total	Component (%)
1	CP/RM				
A	Imported CP/RM (FOB)	74.1	-	74.1	25
	Freight & Insurance	7.0	-	7.0	2
	Import Duty	-	12.2	12.2	4
	Unloading	-	1.6	1.6	1
	Sub-total	81.1	13.8	94.9	32
B	Local CP/RM	-	0.0	0.0	0
	CP/RM Total	81.1	13.8	94.9	32
2	Utilities	0.0	0.0	0.0	0
	Variable Cost	81.1	13.8	94.9	32
3	Depreciation	100.7	29.2	129.9	43
4	Amortization	0.0	-	0.0	0
5	Maintenance	40.1	8.1	48.2	16
6	Design Fee	0.0	-	0.0	0
7	Labor	-	0.0	0.0	0
8	Ovehead	-	14.1	14.1	5
9	Admin.Cost	-	13.5	13.5	4
	Fixed Cost	140.8	64.9	205.7	68
	Annual Cost	221.9	78.7	300.6	100
	Unit P.Cost				
10	Mark-up				
11	Excise Tax				
	Ex-fact.Cost				

#3-3 Die & Jig Production

- No.5 HI: Die and Jig Production Shop -

(1) Details of the Plan

(For the details, see Attached Table 1-1.)

1) Wear and tear of machinery and equipment, jigs and dies of every factory are in progress, which is seriously hampering production and resulting in the decline of both production capacity and quality.

In order to resolve these problems as early as possible, establishment of an auxiliary machine shop at every HIs (Nos. 1, 3 and 4) is planned (#3-1). Further, the present plan is to establish a Die & Jig Production Shop. This shop will play a leading role in the hardware aspect of production engineering.

2) With respect to the software aspect, the Production Engineering Center will be in charge. The Center will improve the manufacturing technologies of dies and jigs in order to contribute to the improvement of HIC's productivity and quality, and cost reduction.

3) Said Die & Jig Production Shop will be set up at No.5 HI. The shop will be responsible for the improvement of machine, working technology including maintenance, repair, and new production of machinery and equipment in cooperation with the Production Engineering Center.

4) Major functions

a) Die Production : Castings mold, forging dies, sheet metal press dies, aluminium die-casting dies.

b) Jig manufacturing : Machining jigs, welding and assembling jigs and other jigs for production.

c) Repairs : Manufacture and repair of large sized parts for machinery and equipment, dies and jigs which cannot be repaired by the auxiliary machine shop of each HI.

5) Planned Annual Production Amount

a)	New die production (small and medium size)	96 pcs
b)	New die production (large size)	12 pcs
c)	Die repairs	288 pcs

(2) Estimated Capital Requirement

1) Required Facilities

Machinery and equipment required for the plan is indicated in Attached Table 2-1. Attached Table 2-2 shows the list of M/E available in No.5 HI and to be utilized in the present plan.

2) Estimated Capital Requirement

The estimated capital requirement for the plan is as indicated in Attached Table 2-3.

Attached Table 1-1 CONTENTS OF THE PROJECT FOR A DIE AND JIG PRODUCTION SHOP OF No.5 HI

Place of installation / Description	No.5 HI	
Building	To be newly constructed within No.5 HI (if any building is available, that building will be utilized). Required area: Building 100m x 54m = 5,400m²	
Outline of machinery & equipment	1) 10 machines of No.5 HI will be deverted. (Will be used in two shifts in consideration of machine tool production.) 2) Machine working facilities. (Machinery and equipment of the auxiliary machine shop of No.3 HI will be partially deverted.) 3) Heat treatment facilities. (same as above)	
Technical data and technical guidance	Technical data 1) Data and drawings of building, wiring and piping 2) Schematic drawing illustrating how to install machinery and equipment and their layout manual 3) Production facilities handling and operating manual 4) Design drawings of dies and jigs provided by their makers 5) JIS (for steel, non-ferrous metals, design methods of machinery) 6) Maker's specifications & standards	Technical guidance 1) Guidance on building construction 6 man-months 2) Guidance on installation and test run of machinery and equipment 34 man-months 3) Guidance on die and jig making (machining, assembling and finishing) 60 man-months x 4 4) Guidance on design work of jigs and dies 12 man-months x 4 5) Training in Japan of personnel involved in 2) to 4) above. 60 man-months x 4
Major component parts (C/P) and raw materials (R/M)	Imported goods 1) Parts or components (C/P) 3-13% 2) Raw materials (R/M) 5-16%) Indicate the ratios of C/P and R/M assuming finished products as 100%. Steel materials, cutting tools, electric, pneumatic, sequencing equipment and materials standard parts, makers' specialties.	
Operating expenses	1) Power : 795 kW 2) Water : 0.20 m³/Hr 3) Compressed air: 4.07 m³/Hr	
Remarks	The Dies and Jigs Production Shop is desirable to be totalized installation including the production of gauges and cutting tools.	

Attached Table 2-1 LIST OF REQUIRED FACILITIES

#: 3-3 Die Making
~ No.5 HI: # Die Making Shop -

No	Items	Unit	No.
1	Bldg & Land		
A	Land		
B	Bldg (100x54m/material incl. wiring&piping for power line)	Lot	1
2	Imported M/E		
1	Facilities for No.1 HI		
1 1	Double housing type horizontal boring milling M/C	Set	1
1 2	Double housing type NC copy milling M/C	Set	1
1 3	Profile gas cutting M/C	Set	1
1 4	Horizontal boring milling M/C	Set	1
1 5	Electric discharge M/C	Set	1
1 6	Universal grinding M/C	Set	1
1 7	Internal grinding M/C	Set	1
1 8	Planomiller	Set	1
1 9	Radial drilling M/C	Set	1
110	Precipitant collecting equipment (dust)	Set	1
111	Arc welding M/C	Set	4
112	Die spotter 100 ton	Set	1
113	Die spotter 30 ton	Set	1
114	High-frequency equipment for grinder	Set	1
115	High-frequency grinder	Set	5
116	Arc welding rod drying equipment	Set	1

Attached Table 2-2 LIST OF M/E AVAILABLE IN NO.5 HI AND TO BE UTILIIN THE PLA

#: 3-3 Die Making
- No.5 HI: # Die Making Shop -

No	Items	Unit	No.
1	Bldg & Land		
A	Land		
B	Bldg		
2	Imported M/E		
1	Planer		
2	Portal milling M/C	Set	1
3	Openside planing M/C	Set	1
4	Portal-type guidway and surface grinding M/C	Set	1
5	Milling M/C	Set	1
6	Upright co-orginate drilling M/C	Set	1
7	HYDROPTIC-6A	Set	1
8	Single column vertical turning and boring mill	Set	1
9	Vertical copy milling	Set	1
10	Die spotter 50ton	Set	1

Attached Table 2-2: REQUIRED INVESTMENT (#3-3)

(Unit: million yen)

	Items	Investment		
		Foreign	Local	Total
1	Bldg & Land			
A	Land	-	0.0	0.0
B 1	Building	378.5	381.5	760.0
2	Freight & Insurance	36.0	-	36.0
	Sub-total	414.5	381.5	796.0
3	Import Duty	-	62.2	62.2
4	Unloading	-	8.3	8.3
	Building Total	414.5	452.0	866.5
	Bldg & Land Total	414.5	452.0	866.5
2 1	Imported M/E (FOB)	3506.2	-	3506.2
2	Freight & Insurance	333.1	-	333.1
	Sub-total	3839.3	-	3839.3
3	Import Duty	-	575.9	575.9
4	Unloading	-	76.8	76.8
5	Installation Cost	-	3.0	3.0
	Imported M/E Total	3839.3	655.7	4495.0
3	Local M/E	-	0.0	0.0
4	Other Costs			
A	License Fee	50.6	-	50.6
B	Eng Fee	1206.0	-	1206.0
C	Software	42.0	-	42.0
D	Interest	0.0	-	0.0
	Other Costs Total	1298.6	-	1298.6
	Total Investment	5552.4	1107.7	6660.1

#3-4 Establishment of Cutting Tools Manufacturing Shop
- No.5 HI: #Cutting Tool Manufacturing Shop -

(1) Objectives and Outline of the Plan

Burma imports all of the cutting tools such as drills, reamers, milling cutters, taps, dies and other form tools, the purchase amount of which is said to be large.

By importing tool steel materials such as SK steel, SKS steel and SKH steel and processing, forming and manufacturing those into aforesaid cutting tools, a saving in foreign currency will be made.

1. To manufacture the aforesaid cutting tools, a minimum assortment of machinery and equipment is indispensable which will made the facilities investment too large compared to the number of pieces planned to be produced by HIC.

2. Advanced technology and skill are needed to manufacture the tools, for which workers must be trained for 5 to 10 years.

3. Sophisticated knowhow is necessary in order to make high performance tools. Accordingly, special measures must be taken to offer technical guidance on the manufacture of cutting tools.

4. In consideration of the foregoing matters, machinery and equipment for production of cutting tools will be installed in two stages, first for the drill group and later for the tap group.

In consideration of the above, this project will be implemented as follows.

a) SK steel, SKH steel, SKS steel and other tool steel materials will be purchased with which the following tools which can be produced will be processed, formed and manufactured.

   1. Twist drill (3ø-15ø)
   2. Reamer (4ø-25ø)

3. Tap (4ø-25ø)
4. Milling cutter (4ø-150ø)
5. Form tool
6. Screw die (M3-M16)

Notes:

1. Twist drills smaller than 3ø are excluded from this project in order to avoid excessive investment as they require special manufacturing methods and the number of prices that will be used is presumably small.

2. Investment in manufacturing facilities will be planned in the following two groups.

   a. Drill group (machine working): Twist drill, reamer, milling cutter, form tool

   b. Tap group (machine working): Tap, screw die

   The heat treatment and inspection group will be formed with a. and will handle all items of a., and b. after start of production of b.
   As for form tools, those which can be produced with the machinery and equipment to be invested as above will only be produced.

b) Carbide tools may be manufactured either by the throwaway method or by the brazing method. As huge investment is necessary to adopt the throwaway method, brazing equipment will be induced to produce carbide tools by brazing the shank section.

c) Cemented carbide tips will be imported as their production requires advanced techniques and a huge investment to the small number of demand expected.

d) Items to be Produced, and Planned Annual Production Amount

Items to be Produced	Planned Annual Production
1. Twist drill (3ø-15ø)	9,000 pcs/year
2. Reamer (4ø-25ø)	1,000 pcs/year
3. Tap (4ø-25ø)	2,000 pcs/year
4. Milling cutter (40ø-150ø)	2,000 pcs/year
5. Form tools	500 pcs/year
6. Screw dies (M3-M16)	200 pcs/year

For further detail, see Attached Table 1-1.

(2) Estimated Capital Requirement

1) Required Facilities

The detailed list of machine and equipments required in the present plan is shown in Attached Table 2-1.

2) Estimated Capital Requirement

The estimated capital requirement is shown in Attached Table 2-2.

(3) Expected Effects of the Plan

1) Foreign Exchange Saving

With the present planned production, foreign exchange saving cannot be expected in the case of the present plan being implemented (The assumed annual production and cost of parts are shown in the Attached Table 2-4. In case of its domestic production, raw material cost is assumed 80% of cost of parts).

	Foreign Exchange Required at Implementation of Plan (Million yen/annum)	Amount of Foreign Exchange Required for Import (Million yen/annum)
Cost of Parts	-	78.0
Raw Material Costs	62.4	-
Freight and Insurance	5.0	6.1
Sub-total	67.3	84.1
Working Equipment Costs	66.7	-
TOTAL	134.1	84.1

Note: For details of the above costs refer to the Attached Table 2-3.

In case of production of drill group only, foreign exchange outflow will be slightly improved, although foreign exchange saving cannot be expected.

	Foreign Exchange Required at Implementation of Plan (Million yen/annum)	Amount of Foreign Exchange Required for Import (Million yen/annum)
Cost of Parts	-	75.7
Raw Material Costs	60.6	-
Freight and Insurance	4.8	5.9
Sub-total	65.4	81.6
Working Equipment Costs	40.2	-
TOTAL	105.60	81.6

Note: For details of the above costs refer to the Attached Table 2-5, 2-6 and 2-7.

In this case, if the annual planned production will increase 3 times as much as the present one, foreign exchange saving could be expected.

Production (Present Plan = 100)	Foreign Currency Required at Implementation of Plan (Million yen/annum)	Foreign Currency Required for Import (Million yen/annum)
200	171.0	163.2
250	203.7	204.0
300	236.4	244.8

In case of production of Tap Group only, necessary foreign exchange saving is as follows. The production of Tap Group is not recommendable from economic point of view.

	Foreign Exchange Required at Implementation of Plan (Million yen/annum)	Amount of Foreign Exchange Required for Import (Million yen/annum)
Cost of Parts	-	2.3
Raw Material Costs	1.8	-
Freight and Insurance	0.1	0.2
Sub-total	1.9	2.5
Working Equipment Costs	39.6	-
TOTAL	41.5	2.5

Note: For details of the above costs refer to the Attached Table 2-8, 2-9 and 2-10.

4) Other Effect Anticipated

By establishing domestic production system for cutting tools which are presently imported, it will be possible to supply cutting tools to HIC, other industries and other public corporation.

In addition, the accumulated technique of cutting tools production can be applicable to other machining and manufacturing.

(4) Recommendations on the Implementation

It is recommendable that the production of drill group should commence first and tap group production set up as the demand expand.

Attached Table 1-1 CONTENTS OF THE PROJECT FOR MACHINERY & EQUIPMENT FOR PRODUCTION OF CUTTING TOOLS

Place of installation / Description	No.5 HI	
Building and required floor area	- Construct a new building or utilize No.5 HI's building - Drill group (machining) about 660 m² - Tap group (machining) about 330 m² - Heat treatment & inspection about 210 m² Total about 1,200 m²	
Outline of machinery & equipment	1) Drill group production facilities (machining) 2) Tap group production facilities (machining) 3) Heat treatment facilities 4) Inspection equipment 5) Brazing equipment	
Technical data and technical guidance	Technical data 1) Manuals for guidance on machinery, equipment and apparatus to be induced 2) Technical data on manufacturing of cutting tools	Technical guidance 1) Guidance on installation, operation and adjustment of machinery, equipment and apparatus to be induced: 7 persons x 3 months = 21 man-months 2) Training and guidance in industrially advanced countries: 6 persons x 6 months = 36 man-months (One person each for drill, reamer, tap, cutter, dies, and heat treatment)
Major components and materials	1) Tool steel 2) Salt 3) Grindstone	
Operating expenses	1) Power : about 330 kW	
Remark	1) Machinery and equipment will be installed in two stages separately for the drill group and tap group. 2) It is desirable to totalize the gauges, dies and jig production shop for installation.	

Attached Table 3-1 LIST OF REQUIRED FACILITIES

#: 3-4 Cutting Tool Manufacturing
- No.5 HI: # Cutting Tool Manufacturing Shop -

No	Items	Unit	No.
1	Bldg & Land		
A	Land		
B	Bldg		
2	Imported M/E		
1	Major machines & equipment		
1 1	Drills manufacturing equipment	Set	1
1 2	Taps manufacturing equipment	Set	1
1 3	Heat treatment equipment	Set	1
1 4	Inspection equipment	Set	1
1 5	Brazing equipment	Set	1
2	Other machines & equipment		
2 1	Spare parts	Lot	1
2 2	Jig	Set	1

Attached Table 2-2: REQUIRED INVESTMENT (#3-4)

(Unit: million yen)

	Items	Investment		
		Foreign	Local	Total
1	Bldg & Land			
A	Land	-	0.0	0.0
B 1	Building	69.1	96.3	165.4
2	Freight & Insurance	5.5	-	5.5
	Sub-total	74.6	96.3	170.9
3	Import Duty	-	11.2	11.2
4	Unloading	-	1.0	1.0
	Building Total	74.6	108.5	183.1
	Bldg & Land Total	74.6	108.5	183.1
2 1	Imported M/E (FOB)	632.5	-	632.5
2	Freight & Insurance	50.6	-	50.6
	Sub-total	683.1	-	683.1
3	Import Duty	-	102.5	102.5
4	Unloading	-	9.6	9.6
5	Installation Cost	-	5.0	5.0
	Imported M/E Total	683.1	117.1	800.2
3	Local M/E	-	0.0	0.0
4	Other Costs			
A	License Fee	0.0	-	0.0
B	Eng Fee	102.4	-	102.4
C	Software	64.8	-	64.8
D	Interest	0.0	-	0.0
	Other Costs Total	167.2	-	167.2
	Total Investment	924.9	225.6	1150.5

Attached Table 2-3: PRODUCTION COST STATEMENT (#3-4)

	Items	Annual Cost (million Yen) F/C	L/C	Total	Component (%)
1	CP/RM				
A	Imported CP/RM (FOB)	62.4	-	62.4	35
	Freight & Insurance	5.0	-	5.0	3
	Import Duty	-	10.1	10.1	6
	Unloading	-	0.9	0.9	1
	Sub-total	67.4	11.0	78.4	44
B	Local CP/RM	-	0.0	0.0	0
	CP/RM Total	67.4	11.0	78.4	44
2	Utilities	0.0	3.1	3.1	2
	Variable Cost	67.4	14.1	81.5	46
3	Depreciation	44.0	11.2	55.2	31
4	Amortization	0.0	-	0.0	0
5	Maintenance	22.7	6.4	29.1	16
6	Design Fee	0.0	-	0.0	0
7	Labor	-	6.6	6.6	4
8	Ovehead	-	4.4	4.4	2
9	Admin.Cost	-	1.1	1.1	1
	Fixed Cost	66.7	29.7	96.4	54
	Annual Cost	134.1	43.8	177.9	100
	Unit P.Cost				
10	Mark-up				
11	Excise Tax				
	Ex-fact.Cost				

Attached Table 2-4 : Assumed Imported Product/RM Costs of Cutting Tools

No	Items	Unit Import Price (¥/pc) (A)	Annual Prd'n (Pcs) (B)	RM Costs (¥/yr) (C)	Total F.E. Cost *) (¥/yr) (D)
1	Twist Drill	1720	9000	12384000	15480000
2	Reamer	6700	1000	5360000	6700000
3	Tap	1020	2000	1632000	2040000
4	Milling Cutter	21770	2000	34832000	43540000
5	Form Tool	20000	500	8000000	10000000
6	Screw Die	1300	200	208000	260000
			14,700	62,416,000	78,020,000

Notes:
(A): FOB price
(C):80% of product price (A)
(D)= (A)*(B)
*) Costs in case of product import

Attached Table 2-5: REQUIRED INVESTMENT (#3-4)
- Drill Group Only -
(Unit: million yen)

	Items	Investment		
		Foreign	Local	Total
1	Bldg & Land			
A	Land	-	0.0	0.0
B 1	Building	69.1	96.3	165.4
2	Freight & Insurance	5.5	-	5.5
	Sub-total	74.6	96.3	170.9
3	Import Duty	-	11.2	11.2
4	Unloading	-	1.0	1.0
	Building Total	74.6	108.5	183.1
	Bldg & Land Total	74.6	108.5	183.1
2 . 1	Imported M/E (FOB)	358.8	-	358.8
2	Freight & Insurance	28.7	-	28.7
	Sub-total	387.5	-	387.5
3	Import Duty	-	58.1	58.1
4	Unloading	-	5.4	5.4
5	Installation Cost	-	5.0	5.0
	Imported M/E Total	387.5	68.5	456.0
3	Local M/E	-	0.0	0.0
4	Other Costs			
A	License Fee	0.0	-	0.0
B	Eng Fee	52.0	-	52.0
C	Software	0.0	-	0.0
D	Interest	0.0	-	0.0
	Other Costs Total	52.0	-	52.0
	Total Investment	514.1	177.0	691.1

Attached Table 2-6: PRODUCTION COST STATEMENT (#3-4)
- Drill Group Only -

	Items	Annual Cost (million Yen) F/C	L/C	Total	Component (%)
1	CP/RM				
A	Imported CP/RM (FOB)	60.6	-	60.6	42
	Freight & Insurance	4.8	-	4.8	3
	Import Duty	-	9.8	9.8	7
	Unloading	-	0.9	0.9	1
	Sub-total	65.4	10.7	76.1	53
B	Local CP/RM	-	0.0	0.0	0
	CP/RM Total	65.4	10.7	76.1	53
2	Utilities	0.0	3.1	3.1	2
	Variable Cost	65.4	13.8	79.2	55
3	Depreciation	26.3	9.3	35.6	25
4	Amortization	0.0	-	0.0	0
5	Maintenance	13.9	4.9	18.8	13
6	Design Fee	0.0	-	0.0	0
7	Labor	-	6.6	6.6	5
8	Ovehead	-	3.6	3.6	2
9	Admin.Cost	-	0.9	0.9	1
	Fixed Cost	40.2	25.3	65.5	45
	Annual Cost	105.6	39.1	144.7	100
	Unit P.Cost				
10	Mark-up				
11	Excise Tax				
	Ex-fact.Cost				

Attached Table 2-7 : Assumed Imported Product/RM Costs of Cutting Tools

No	Items	Unit Import Price (¥/pc) (A)	Annual Prd'n (Pcs) (B)	RM Costs (¥/yr) (C)	Total F.E. Cost *) (¥/yr) (D)
1	Twist Drill	1720	9000	12384000	15480000
2	Reamer	6700	1000	5360000	6700000
3	Milling Cutter	21770	2000	43540000	43540000
4	Form Tool	20000	500	10000000	10000000
			12,500	71,284,000	75,720,000

Attached Table 2-10 : Assumed Imported Product/RM Costs of Cutting Tools

No	Items	Unit Import Price (¥/pc) (A)	Annual Prd'n (Pcs) (B)	RM Costs (¥/yr) (C)	Total F.E. Cost *) (¥/yr) (D)
1	Tap	1020	2000	1632000	2040000
2	Screw Die	1300	200	208000	260000
			2,200	1,840,000	2,300,000

Notes:
(A): FOB price
(C):80% of product price (A)
(D)= (A)*(B)
*) Costs in case of product import

Attached Table 2-8: REQUIRED INVESTMENT (#3-4)
- Tap Group Only -
(Unit: million yen)

	Items	Investment		
		Foreign	Local	Total
1	Bldg & Land			
A	Land	-	0.0	0.0
B 1	Building	69.1	96.3	165.4
2	Freight & Insurance	5.5	-	5.5
	Sub-total	74.6	96.3	170.9
3	Import Duty	-	11.2	11.2
4	Unloading	-	1.0	1.0
	Building Total	74.6	108.5	183.1
	Bldg & Land Total	74.6	108.5	183.1
2 1	Imported M/E (FOB)	352.8	-	352.8
2	Freight & Insurance	28.2	-	28.2
	Sub-total	381.0	-	381.0
3	Import Duty	-	57.1	57.1
4	Unloading	-	5.3	5.3
5	Installation Cost	-	5.0	5.0
	Imported M/E Total	381.0	67.4	448.4
3	Local M/E	-	0.0	0.0
4	Other Costs			
A	License Fee	0.0	-	0.0
B	Eng Fee	50.4	-	50.4
C	Software	64.8	-	64.8
D	Interest	0.0	-	0.0
	Other Costs Total	115.2	-	115.2
	Total Investment	570.8	175.9	746.7

Attached Table 2-9: PRODUCTION COST STATEMENT (#3-4)
- Tap Group Only -

	Items	Annual Cost (million Yen) F/C	L/C	Total	Component (%)
1	CP/RM				
A	Imported CP/RM (FOB)	1.8	-	1.8	3
	Freight & Insurance	0.1	-	0.1	0
	Import Duty	-	0.3	0.3	0
	Unloading	-	0.0	0.0	0
	Sub-total	1.9	0.3	2.2	3
B	Local CP/RM	-	0.0	0.0	0
	CP/RM Total	1.9	0.3	2.2	3
2	Utilities	0.0	3.1	3.1	5
	Variable Cost	1.9	3.4	5.3	8
3	Depreciation	25.9	9.2	35.1	52
4	Amortization	0.0	-	0.0	0
5	Maintenance	13.7	4.9	18.6	27
6	Design Fee	0.0	-	0.0	0
7	Labor	-	6.6	6.6	10
8	Ovehead	-	1.7	1.7	3
9	Admin.Cost	-	0.4	0.4	1
	Fixed Cost	39.6	22.8	62.4	92
	Annual Cost	41.5	26.2	67.7	100
	Unit P.Cost				
10	Mark-up				
11	Excise Tax				
	Ex-fact.Cost				

#3-5 Establishment of Production Engineering Center
- No.5 HI -

(1) Details of the Plan

The purpose of establishment of the Production Engineering Center is to improve and advance HIC's production engineering by collecting the production engineering of each HI, and at the same time, to plan and design dies, jigs and gauges and cutting tools in order to support the production activity of each HI through these repair and production shops to be installed at No.5 HI.

As the first stage in line with this purpose, a production engineering team with a small number of trainees will be organized within the auxiliary machine shop to be installed at each HI to allow the team to acquire the production engineering while experiencing repair engineering for various equipment, dies, jigs and tools at the shops in order to form future Production Engineering Center key staff.

As the second stage, equipment which is capable of performing large-sized repairs and production for dies and jigs to some extent will be brought in the auxiliary machine shop at No.3 HI, whereby the Production Engineering Team will be more trained to make further progress.

Since No.3 HI has small-scale die repairing equipment and considerable engineering ability and has had the ground to cultivate the production engineering, it is considered reasonable to develop the team's technical ability with this as the base.

As the third stage, at the same time when a new repair and production shop for dies, jigs, gauges and cutting tools is established at No.5 HI, the Production Engineering Center will be established at No.5 HI and the staff of the Center will be selected from the Production Engineering Team at each HI.

In this case there is a problem whether the equipment installed at No.3 HI in the second stage should be transferred to No.5 HI in the third stage or the said equipment should not be installed at No.3 HI in the second stage but directly installed at No.5 HI. It is consi-

dered that this problem should be determined by judging from the engineering acquisition of the Production Engineering Team and the conditions of training at that time.

Even after the Production Engineering Center has been established, the Production Engineering Teams at each HI will remain as they are and continue to closely communicate to each HI and support in the production engineering aspect.

The Production Engineering Center will not be belonged to HI in the organization but be placed under the direct control of the Headoffice, and will play a supporting role to each HI as an auxiliary division for the production following this modernization plan.

a) The functional system sharing for the Production Engineering Center (including each shop to be established in No.5 HI) and the Auxiliary Machine Shop at each HI is as shown in Attached Table 1-1.

b) Schedule for Establishment of the Production Engineering Center and its related Shops

   In accordance with attached Table 1-2 Schedule for Establishment of the Production Engineering Center (including Auxiliary Machine Shops of Each HI and Shop to be Set up at No.5 HI)

c) Organization of the Production Engineering Center

   According to Attached Figure 1-1 Organization Chart of the Production Engineering Center (including Auxiliary Machine Shops of each HI).

d) Facilities of the Production Engineering Center

   a) Design room and office room 800 m2
   b) Equipment for design and office work

e) Training of Personnel for the Production Engineering Center

In accordance with Attached Table 1-3 Training Programs of Personnel for the Production Engineering Center.

(2) Estimated Capital Requirement

1) Required Facilities

Machinery and equipment required for the plan is indicated in Attached Table 2-1.

2) Estimated Capital Requirement

The estimated capital requirement for the plan is as indicated in Attached Table 2-2.

Attached Table 1-1 TABLE OF ORGANIZATIONAL FUNCTIONS SHARED AMONG THE PRODUCTION ENGINEERING CENTER AND AUXILIARY MACHINE SHOPS OF EACH HI

Object technology / Functions & organizational arrangements		Production Engineering Center (Modification and New Building of Production Machinery and Equipment)						Each HI's Auxiliary Machine Shop (Repairs of Existing Facilities)					
		Mechanical facilities		Jigs	Dies	Gauges	Cutting tools	Mechanical facilities	Spare parts control	Jigs	Dies	Conveying equipment	Product development and trial manufacture
		General-purpose machinery	Special machinery	for processing	Forging	Plug	Drill	Machine tools	Machine tools	for processing	Forging	Conveyor	Trial manufacture of component parts of Developed products
		Machine tool		for assembling	Press	Snap	Reamer	Press	Press	for assembling	Press	Conveying vehicle	Trial manufacture for local production and modification
		Press, etc.		for welding	Casting pattern	Spline	Tap	Process equipment	Process equipment	for welding	Casting pattern	Forklift,	(Only No.3 HI)
		Conveying equipment		Template,	Die casting	Screw	Milling cutter,	Others in general	Others in general	etc.	etc.	etc.	
				etc.	Cell	etc.	etc.						
Developmental design	New making technology		△ (partial)	○	○	○	○						
	Modification technology	○	○	○	○	○	○						
	Repairing technology	○	○	○	○	○	○	○	○	○	○	○	○
Drawing	Specifications	○	○	○	○	○	○						
	Assembling and completed product drawings	○	○	○	○	○	○						
	drawings of all component parts	○	○	○	○	○	○						
	Sequencing diagram	○	○	○	○								
	Drawings of repair parts	○	○	○	○			○		○	○	○	
Manufacture	All component parts	○		○	○	○	○						
	Specific parts							○		○	○	○	○
	Assembly & adjustment	○		○	○		○	○	○	○	○	○	
Inspection	Equipment performance	○		○	○	○	○	○		○	○		
	Restoration performance	○		○	○	○	○	○		○	○	○	
Specifications of shop facilities													
Size of machinable parts	Large	○		○	○								
	Intermediate	○		○	○	○	○	○		○	○	○	○
	Small	○		○	○	○	○	○		○	○	○	○

Attached Table 1-2 SCHEDULE FOR THE ESTABLISHMENT FOR PRODUCTION ENGINEERING CENTER
(INCLUDING AUXILIARY MACHINE SHOPS OF EACH HI)

	89	90	91	92	93	94	95	96	97	98
Project implementation items	a) Preparation for establishment of auxiliary machine shops at each HI and die repair shop at No.1 HI.		a) Establishment of auxiliary machine shop b) Internal manufacture of spare parts c) Establishment of die repair shop		a) Establishment of production engineering center capable of planning and designing dies & jigs b) Establishment of cutting tool (drill group) production shop		a) Establishment of gauge production shop		a) Establishment of die an jig production shop b) Establishment of cutting tool (tap group) manufacturing shop	
Auxiliary machine shop of each HI No.1 HI's die repair shop Production Engineering Center Gauge Production Shop Cutting Tool Production Shop Die & Jig Production Shop	Maintenance of machinery and equipment installed at each HI and internal production of parts Repair of dies at No.1 HI		Expansion of facilities at NO.3 HI Plan for establishment of Production Engineering Center at No.5 HI		Launching of Engineering Center Manufacture of cutting tools (drill group) at No.5 HI		Amplification and upgrading of Production Engineering Center Manufacture of gauges at No.5 HI		Additional installation of cutting tool (tap group) production facilities Manufacture of dies and jigs at No.5 HI	
Implementation items	a) Auxiliary Machine Shops will be set up at No.1 HI, No.3 HI and No.4 HI and machinery and equipment for repair will be provided or replenished. b) Facilities and manpower mainly for the Repair Shops of each HI will be provided and expanded. c) Mainly perform repair and maintenance of existing machinery and equipment. d) Secure spare parts. e) Prepare and promote routine checking system. f) Hysteresis record (technical, accuracy) of machinery and equipment will be prepared to help ensure production and quality. g) Develop human resources with the intent of establishing the Production Engineering Center at No.5 HI.		a) Internally manufacture spare parts for repair. b) Prepare drawings of spare parts for their internal production. c) Expand facilities so as to be able to completely repair dies and jigs. d) Facilities will be made capable of reworking or newly making relatively simple dies and jigs out of those used currently. e) Facilities will be supplemented in consideration of quantitative requirements with the overlapping of repairs, reworking and die making work. f) Develop talented men who can prepare drawings of the relatively simple dies and jigs out of those used currently so that they can rework or newly make them as suitable ones for Burma (functionally and in terms of the ability to make them). g) Develop skilled workers who can rework or newly make those dies and jigs according to these drawings. h) Offer necessary training to the foregoing engineers and skilled workers. i) Prepare the project for establishing the Production Engineering Center and start planning with the participation of the consultant if necessary. j) Utilize the sectors for design of jigs, tools, dies and patterns and machinery and equipment of HIC's existing Design Department.		a) Start establishing the Production Engineering Center at No.5 HI. b) Start with the inducement of machinery and equipment, which is realistically feasible, with a view to simplify the facilities of No.5 HI over time. c) Start from planning, designing, drawing and manufacturing of simple dies, jigs gauges and cutting tools and develop many engineers and workers to be skillful in these works. d) At this time, Auxiliary Machine Shops of each HI will be placed under the control of the Production Engineering Center to carry out personnel interchange to supply the Production Engineering Center wit engineers and skilled workers fully conversant with the production floor practices. e) Auxiliary Machine Shops of each HI shall develop many successors of engineer and skilled workers. f) Clearly define the respective duties of the Production Engineering Center and Auxiliary machine Shop of each HI, and depending on the results, transfer machinery and equipment to No.5 HI. g) Consider utilizing existing machinery and equipment of No.5 HI.		a) Expand machinery and equipment for the Production Engineering Shop including new manufacturing of dies, jigs and gauges. g) Consider orientation toward specialization of machinery and equipment. (Taking dies for example, dies for forging, for press or for die casting, etc.) c) Strengthen the organization of the Production Engineering Center. d) Line up talented manpower capable of designing dies, jigs, and gauges and improving production engineering in each field of specialization. e) Acquire technology and technical skill to be able to manufacture almost all dies and jigs needed by HIC.		a) Induce machinery and equipment necessary for manufacturing cutting tools. b) Consider inducing research equipment and facilities necessary for the development of production engineering. (Conversion to NC and MC, etc.) c) Induce machinery and equipment for automating production and transfer these to each HI. d) Conversion of die making to CAD and CAM. e) Develop control engineers (computer engineers). f) Develop engineers and skilled workers for conversion of design and production to CAD and CAM.	
Functions (duties)	Functions (duties) of Auxiliary Machine Shops at each HI 1. Repair of machinery and equipment 2. Manufacturing, storage and supply of spare parts for repair. 3. Repair work on dies, jigs, fixtures, and conveying equipment. 4. Manufacturing of simple dies, jigs, fixtures and conveying equipment. 5. Designing and drawing of spare parts for repair, simple dies, jigs, fixtures and conveying equipment. 6. Preparation of management data for maintenance of production facilities (hysteresis record of machinery and equipment, dies, jigs, etc.) 7. Participation in developing guidelines to let every production shop carry out maintenance (preventive maintenance such as routine checking and periodical checking.) 8. Trial production of component parts for development and test (product improvement, local production, modification and other purposes).				Functions (duties) of the Production Engineering Center 1. Control and maintenance of production machinery and equipment of each HI (through Auxiliary Machine Shops of each HI) 2. Repair, renewal, strengthening and expansion of production machinery and equipment. 3. Improvement of production facilities (change in layout, etc.) 4. Development and improvement of production engineering (preparation for production, development of new technology, improvement of existing technology, development of production line, research, planning, etc.) 5. Design and improvement of casting patterns, dies and moulds for sheet metal forming, rubber and plastic moulding, forge forming, die casting, shell moulding, etc. 6. Design and improvement of jigs, fixtures and conveying equipment. 7. Design and improvement of gauges and measuring instruments. 8. Design of cutting tools for machining.			

Attached Table 1-3 LIST OF TRAINING PROGRAMS OF THE PERSONNEL REQUIRED FOR THE PRODUCTION ENGINEERING CENTER

Engineer (University or TTC graduates, or their equivalent)	Period	Skilled worker (Training school graduates, or their equivalent)	Period
1. Acquisition of work site knowledge		1. Develop training school graduates as the personnel of the Production Engineering Center from the outset.	
(1) Grasping the entire HIC products (lectures and field practices). Functions, composition, materials, components, etc. of each product.	1 month	(1) General training	1 year
		a) Functions, composition, materials, and other knowledge of products and components	
(2) Acquisition of overall knowledge on production (lectures and field practices at each shop). Flow from raw materials to casting and forging, press working, welding, heat treatment, machining, surface treatment (plating, painting), finishing, assembling, inspection and production line.	6 months	b) Education and training in materials and working methods directly linked with the work on the production floor.	
		c) Special knowldge with job specialization	
(3) Specialized training	6 months	d) Shop practices (every and all types of job in a general way)	
a) University graduates must be specialized according to their respective fields of major study.		(2) Assignment to respective specialized job classification on-the-job training to acquire skill). Upon completion of 1-year training, job classification and assignment shall be determined.	2 years
b) University graduates will be appointed to certain posts with due consideration to the future of the Production Engineering Center.		a) Design, drawing	
Roughly determine the respective field of specialization of these personnel, such as casting, forging, press working, welding, heat treatment, machining, etc. and train them mainly in the shops relevant to their specialized fields.		b) Field work, machining, finishing, assembling, measuring, repairing, etc.	
		(3) During the training period on the production floor, offer short (10 days or so) training courses three or four times (on materials, components, new working methods, safety, cutting tools, quality, activities in small groups, etc.)	
2. Acquisition of technical knowledge (training) - learning while carrying out duties.			
(1) As university graduates are assumed to have the necessary engineering knowledge, train them in matters that are encountered in actual situations at HIC. (characteristics of materials, functional performance of machine tools, mechanism, casting and forging, press working method, die making, heat treatment, plating, quality, etc.)	2-3 years	2. Transfer skilled workers now working at each HI.	
		(1) Training prior to transfer to the Production Engineering Center.	half a month
		a) Product knowledge, materials, components, safety, quality, activities in small groups, etc.	
(2) Production training (flow of goods, heat, safety, environment, etc.)		(2) Offer short training courses about twice a year during work.	10 days
(3) Design and drawing (dies, jigs, conveying tools, etc. within their respective field of specialization)		a) Training contents are same as above (pick up new subjects or topics)	
		b) Upgrade the level of training	
(4) Overseas training (in Japan) after a few years of actual work	6 months	c) Inducement of NC machines and education on these machines	
3. Acquisition of advance production engineering knowledge (including overseas training)	3-5 years		
(1) Configuration of production lines, automation of machinery and equipment, control of machinery and equipment (conversion to numerical control and computerization)			
(2) Training on CAD and CAM			

Attached Table 2-1 LIST OF REQUIRED FACILITIES

#: 3-5 Establishment of Production Engineering System
- No.5 HI: # Production Engineering Shop -

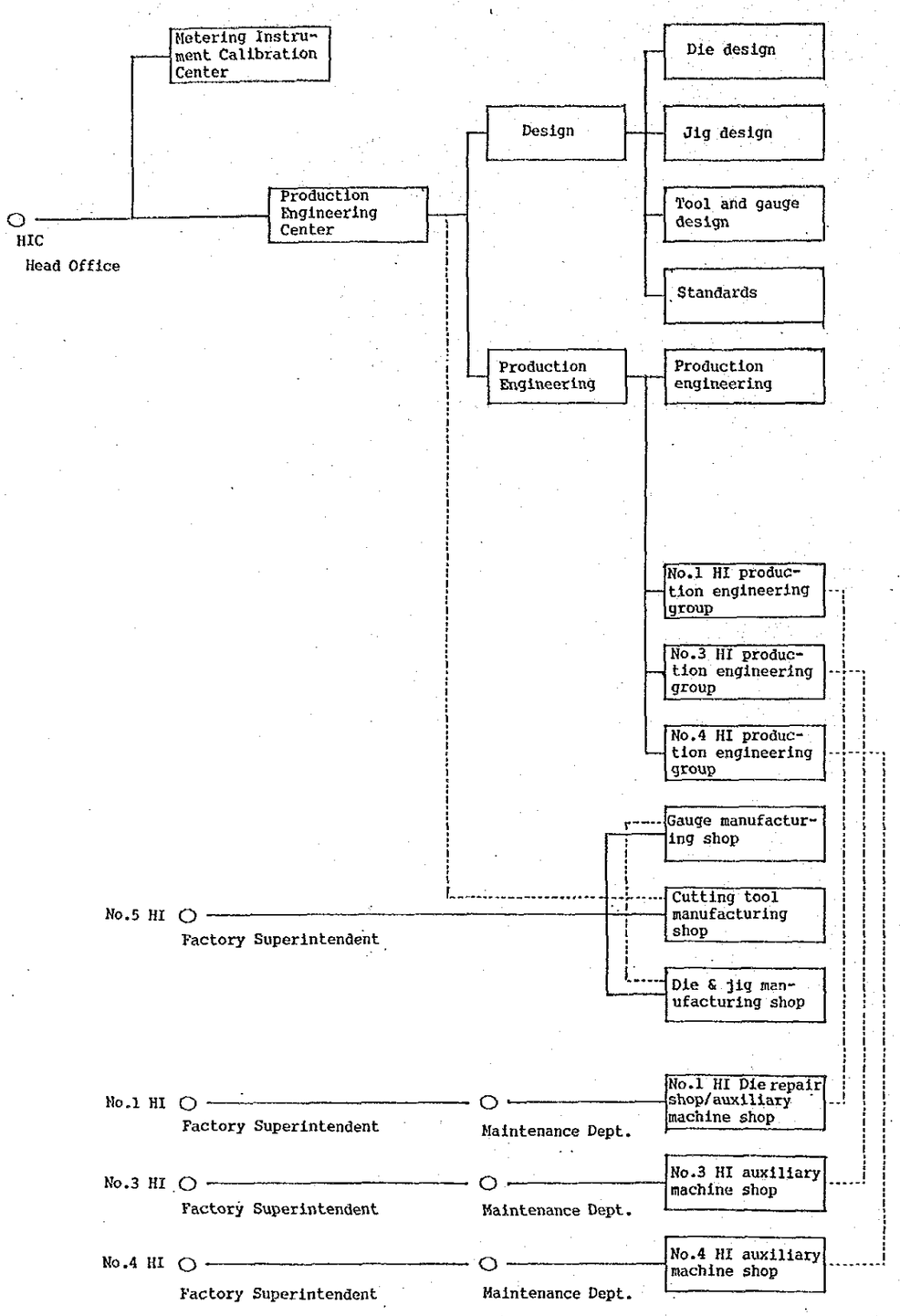
No	Items	Unit	No.
1	Bldg & Land		
A	Land		
B	Bldg		
2	Imported M/E		
1	Design and drawing facilities	Set	1

Attached Table 2-2: REQUIRED INVESTMENT (#3-5)

(Unit: million yen)

Items			Investment		
			Foreign	Local	Total
1		Bldg & Land			
A		Land	-	0.0	0.0
B	1	Building	46.1	64.3	110.4
	2	Freight & Insurance	3.7	-	3.7
		Sub-total	49.8	64.3	114.1
	3	Import Duty	-	7.5	7.5
	4	Unloading	-	0.7	0.7
		Building Total	49.8	72.5	122.3
		Bldg & Land Total	49.8	72.5	122.3
2	1	Imported M/E (FOB)	17.2	-	17.2
	2	Freight & Insurance	1.4	-	1.4
		Sub-total	18.6	-	18.6
	3	Import Duty	-	2.8	2.8
	4	Unloading	-	0.3	0.3
	5	Installation Cost	-	119.8	119.8
		Imported M/E Total	18.6	122.9	141.5
3		Local M/E	-	0.0	0.0
4		Other Costs			
A		License Fee	0.0	-	0.0
B		Eng Fee	0.0	-	0.0
C		Software	0.0	-	0.0
D		Interest	0.0	-	0.0
		Other Costs Total	0.0	-	0.0
		Total Investment	68.4	195.4	263.8

Attached Figure 1-1 ORGANIZATION CHARTS OF THE PRODUCTION ENGINEERING CENTER, AUXILIARY MACHINE SHOPS OF EACH HI, SHOPS SET UP IN NO.5 HI, METERING INSTRUMENT CALIBRATION CENTER



- o Design of casting patterns, shell moulds, forging dies, press dies, diecasting dies, rubber and plastic dies
- o Design of jigs, fixtures, carrying implements and assembling tools
- o Design of gauges and cutting tools
- o Preparation of design standards, parts standards and other technical materials
- o Planning, machining standards, inspection standards, operating standards, safety standards, layout of shop facilities and each production line

  Research and development of production engineering (specialist group); The group will exclusively study and develop new technologies and methods on casting, forging, press working, welding, machining (including cutting tools), plastics, rubber, heat treatment, surface treatment (plating and coating/painting), line configuration (including conveyance), measuring, test run, etc. and transfer R & D results to the people on the production floor for actual application.

- o Endeavors to maintain machinery and equipment in good working condition and improve production engineering by keeping close contact with auxiliary machine shops of each HI.
- o Accumulate technologies for repair by closely adhering to the production floor.
- o Reflect the opinions of production shops on the Production Engineering Center.
- o Must have the design and drawing capabilities.

- o Machinery and equipment shall be utilized in common to avoid duplication of facilities.
- o Existing machinery and equipment of No.5 HI shall be utilized as much as possible.
- o It may be advisable to establish separate job shops for new making and for repairs.

- o Auxiliary machine shops of each HI shall have a function to repair machinery and equipment, dies, jigs, tools, measuring instruments and conveying implements.
- o Maintain the production facilities in cooperation with each production shop.
- o Design and drawing staff are also necessary.
- o Endeavor to maintain machinery and equipment in good working condition and improve production engineering in cooperation with the production engineering group.
- o Develop production engineers well versed in production floor realities.

#4-1 Build-up of Press Capacity
- No.1 HI: Press Shop No. 2 -

(1) Objectives and Outline of the Plan

According to the plan for production of vehicles of HIC, including both light vehicles and heavy vehicles, the output will becomes 2.5 times as large as the current production volume within 10 years as shown in Attached Table 1-1. Furthermore, the production of parts of vehicles will be expanded as well, and also the variety of the parts to be produced will be diversified as shown in the said table.

Such being the case, substantial increase will be required in the capacity of the press-working process, which is the main factor involved in the production of parts of vehicles, in order to cope with the expansion of output and diversification of domestic production mentioned above.

Conspicuous aged deterioration is observed in the facilities of No.1 HI Press Shop No.2, which is the main press-working plant related to vehicles, resulting in decline in the production capacity and the shop is one of the bottlenecks obstructing smooth production of vehicles of HIC.

The first step to be taken to cope with the future needs is to repair and to renew the deteriorated facilities existing in No.1 HI Press Shop No.2 and to eliminate the bottleneck through the introduction of die changing facilities, trimming machines and the like.

As the next step, measures should be taken to cope with the domestic production of such thick-plate parts as disk wheels, main frames, rear axle housing, etc., and large-sized panels. However, introduction of large-sized press equipment will be required for the production of these parts, and it is absolutely impossible to cope with them by merely expand the existing press shop facilities. Therefore, the construction of a new press shop equipped with production line aimed at dealing with the domestic production of the said parts will be necessary.

Attached Table 1-1 shows the outline of the press facilities required to expand the production of vehicles and to diversify the domestic production of parts.

Attached Figure 1-1 shows the relation between the expansion plan of the press facilities and the parts to be worked therein.

The plan for modernization of the existing press shop is described in #4-1 and that of the new press shop is described in #4-2.

(2) Details of the Plan

1) Repair and Replace of Machinery Facilities

Urgent repair and replacement of the mechanical facilities of No.1 HI Press Shop No.2, including the broken down ones, is required because 15 to 20 years have passed since their introduction and they are considerably deteriorated.

Furthermore, systematic maintenance and inspection will be required after their repair.

- Facilities to be Repaired and Replaced

No.1 HI Press Shop No.2

. Repair

Main press	8 units
Sharing machine	3 units
Press brake	1 unit
Fork lift	2 units
Die handler	1 unit
Compressor (HSD type) (Equipped with dryer and filter)	2 units
Small sized jigs	1 set

. Replacement

Press brake	2 units
Shearing machine	2 units
Small sized jigs	1 set

2) Rationalization of the Conveyance of Materials

The press-worked parts are handled manually, and it is recommended to mechanize the job because it is dangerous and furthermore it is a monotonous hard work.

By these measures it will be possible to secure the safety of the workers and to improve the productivity.

- Required Facilities

No.1 HI Press Shop No.2

Conveyor equipment (transportable type) (To be attached to the main large-sized press)	5 units
Fork lift	1 unit
Pallets for conveyance of press-worked panels	1 set

3) Elimination of the Bottleneck

i) Shortening of the Die Changing Time

The die changing operation is taking very long time and this is impairing substantially the operation rate. The adoption of the quick die changing system or die handler system suiting large-variety-small-lot production are suggested as alternatives to improve the situation.

As a result of the study of these two methods, quick die change system was found suitable for the following reasons: Dies can be changed in a shorter time and a higher starting power is available that will be required in meeting increased frequency of die changes with increase in domestically manufactured parts in the future. However, the existing die handler will also continue to be used to supplement quick die change system.

Required Facilities

No.1 HI Press shop No.2

Quick die changing facilities 5 units

These facilities are installed for the following large-sized press machines.

For 500T press
For 400T press
For 300T press
For 200T press

ii) Mechanization of the Cutting

Trimming after drawing is being carried out by means of manual cutter and many dimensionally rejected products are resulting as a consequence. There are two alternatives to cope with the situation, using trimming die and using three-dimensional plasma cutter.

Besides ordinary trimming the plasma type three-dimensional cutting system is usable for blanking, which consists of cutting non-rectangular blanks from standard blanks, trimming and piercing.

This system is especially suited for large-variety-small-lot production because it has general purpose application in spite of the relatively slow cutting speed. Furthermore, this system can be regarded as quite promising because once the cutting data are taught to the machine it is capable to carry out automatically the cutting work.

Required Equipemnt

No.1 HI Press Shop No.2

Three-dimensional plasma type cutting machine	1 unit
Air-conditioning facilities	1 unit

4) Die Repairing Shop

A die repairing facility is planned to be installed adjacent to the No.1 HI press shop No.2.

(3) Estimated Capital Requirement

1) Required Facilities

The detailed list of machine and equipments required in the present plan is shown in Attached Table 3-1.

2) Estimated Capital Requirement

The estimated capital requirement is shown in Attached Table 3-2.

(4) Expected Effects of the Plan

The production capacity especially of small and medium sized press parts will be increased and as a result vehicle production increase and spare parts supply for ordinary market will be ensured.

Attached Table 1-1 DOMESTICALLY PRODUCED PRESS PARTS AND PRESS FACILITIES

	Name of Part	Vehicle Type	Production Volume		Required Facilities		
					Case 1: Separate System		Case 2: Integrated System
			Pieces/ Year	Vehicles/Year 1997 - 98	Light Vehicles Only	Heavy Vehicles Only	Heavy & Light Vehicles
Thin Sheet	1. Panel Side	L (light)	6,000	Light Vehicles	Press Capacity		New Press Shop
	2. Floor Board	"	2,000		1,000 tons x 1		Press Capacity
	3. Cover Cab	"	5,000	B-600 800	500 tons x 2		3,000 tons x 1
	4. Bonnet	"	5,000	X-2000 900	300 tons x 1		1,500 tons x 1
	5. Fender	"	15,000	T-2 Ton Truck 600	200 tons x 1		1,000 tons x 1
				Sub-Total 2,300	80-30 tons x 6		500 tons x 1
					Total 11		300 tons x 1
							150 tons x 1
	6. Roof Cabin	H (heavy)	3,300			New Press Shop	100 tons x 1
	7. R/F Cover Cabin	"	3,300	Heavy Vehicles		Press Capacity	50 tons x 1
	8. R/F Construction	"	3,300			3,000 tons x 1	Total 8
	9. Door Panel	"	9,600	6.5 Ton Truck 1,000		1,500 tons x 1	
				3.5 Ton Truck 150		1,000 tons x 1	
Thick Sheet	10. Disc Wheel Panel	L + V	20,000	BX Bus 150		500 tons x 1	
	11. Rear Axle Housing	L + V	6,000	BM Bus 150		300 tons x 1	
				Sub-Total 1,450		150 tons x 1	
	12. Main Frame	L + V	6,100			100 tons x 1	
						50 tons x 1	
						Total 8	
	Total		84,600	3,750		Existing Press Shop	Existing Press Shop
						500 tons x 1	500 tons x 1
						300 tons x 2	300 tons x 2
						200 tons x 2	200 tons x 2
						100 tons x 3	100 tons x 3
						Total 8	Total 8

Attached Table 3-1 LIST OF REQUIRED FACILITIES

#: 4-1 Build-up of Press Capacity
- No.1 HI: Press Shop No.2 -

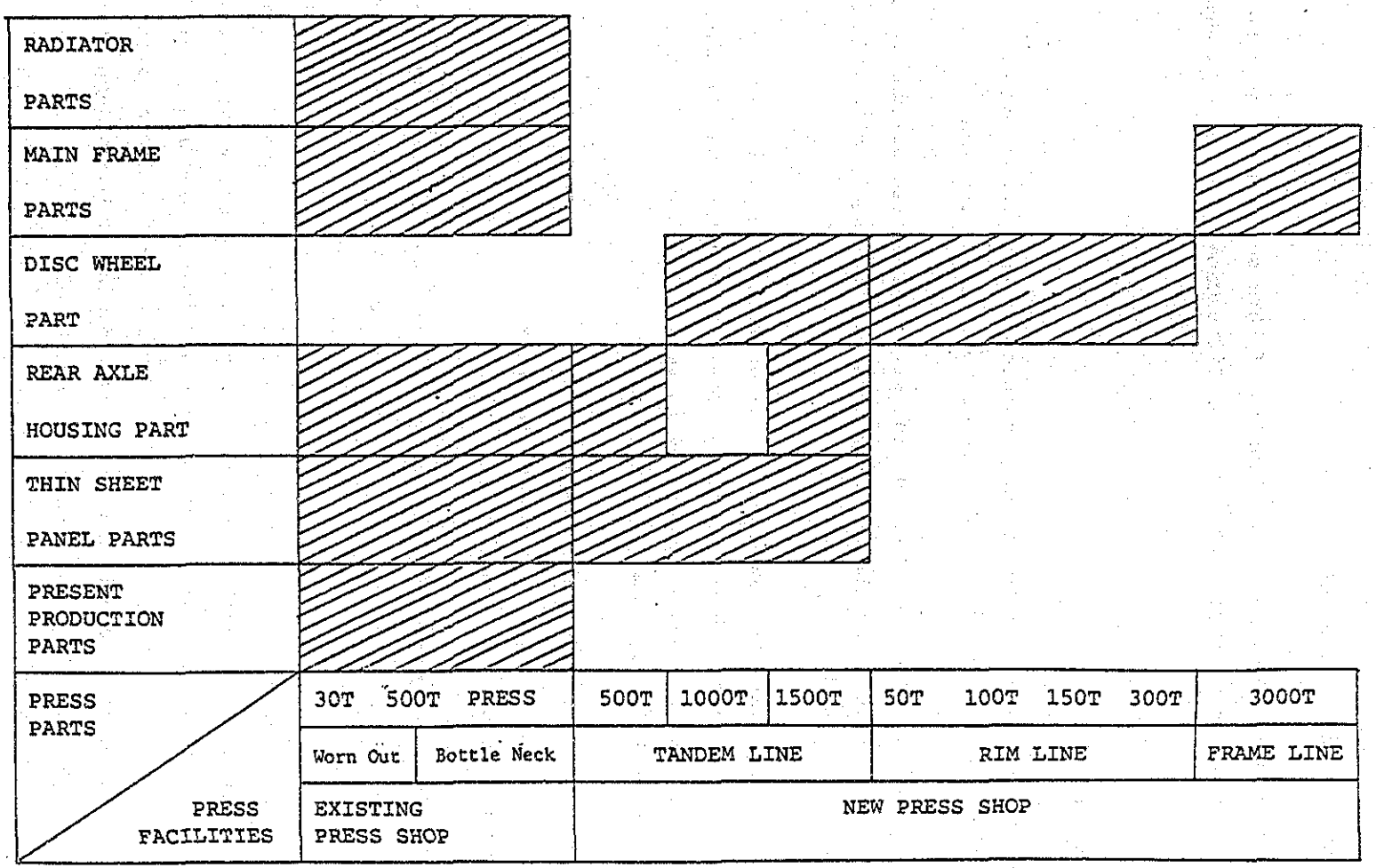
No	Items	Unit	No.
1	Bldg & Land		
A	Land		
B	Bldg		
2	Imported M/E		
1	Replacement of deteriorated ME		
1 1	Overhaul of big press	Set	23
1 2	Overhaul of shearing m/c	Set	4
1 3	Overhaul of press brake	Set	1
1 4	Overhaul of die handler	Set	1
1 5	Overhaul of fork lift	Set	2
1 6	Repair of compressor HSD	Set	2
2	To solve the production bottleneck		
2 1	Automatic quick die changer	Set	5
2 2	Small tools & equipment	Set	1
2 3	Three dimension cutting machine	Set	1
2 4	Trimming dies	Set	1
2 5 1	Handling equipment:portable belt conveyor	Set	1
2 5 2	Handling equipment:Box pallet(for press parts)(matr'l only)	Set	1
2 6	Antirust equipment	Set	1
3	Die repairing facilities		
3 1	Arc welding machine	Set	2
3 2	High-frequency grinder	Set	1
3 3	Die spotter, 30 ton	Set	1
3 4	Jib crane, 2 ton	Set	1
3 5	Radial drilling machine	Set	1
3 6	Miscellaneous	Lot	1

Attached Table 3-2: REQUIRED INVESTMENT (#4-1)

(Unit: million yen)

Items			Investment		
			Foreign	Local	Total
1		Bldg & Land			
A		Land	-	0.0	0.0
B	1	Building	0.0	0.0	0.0
	2	Freight & Insurance	0.0	-	0.0
		Sub-total	0.0	0.0	0.0
	3	Import Duty	-	0.0	0.0
	4	Unloading	-	0.0	0.0
		Building Total	0.0	0.0	0.0
		Bldg & Land Total	0.0	0.0	0.0
2	1	Imported M/E (FOB)	648.5	-	648.5
	2	Freight & Insurance	72.0	-	72.0
		Sub-total	720.5	-	720.5
	3	Import Duty	-	108.1	108.1
	4	Unloading	-	10.1	10.1
	5	Installation Cost	-	8.6	8.6
		Imported M/E Total	720.5	126.8	847.3
3		Local M/E	-	0.0	0.0
4		Other Costs			
A		License Fee	0.0	-	0.0
B		Eng Fee	44.1	-	44.1
C		Software	0.0	-	0.0
D		Interest	0.0	-	0.0
		Other Costs Total	44.1	-	44.1
		Total Investment	764.6	126.8	891.4

Attached Figure 1-1 PRESS PARTS AND REQUIRED PRESS FACILITIES



#4-2 Construction of New Press Shop
No.1 HI: New Press Shop

(1) Objectives and Outline of the Plan

The outline of objectives and planning of this section is the same as mentioned in section #4-1 (Build-up of Press Capacity: No.1 HI Press Shop No.2).

(2) Details of the Plan

- It is necessary to take measures to step up the production of vehicles and to increase the rate of domestic production.

  Construction of new production line will be required besides repair and modernization of the existing ones will be required in this connection.

  Merely improving and modernizing the existing facilities is not sufficient to cope with the said requirements, and the installation of new production lines is necessary instead. In other words, the following lines will be installed anew.

  Disk wheel manufacturing line
  Main frame (chassis) manufacturing line
  Rear axle housing manufacturing line

  Large-sized panels, that can not be molded with the existing press, will be manufactured by using the 1500T hydraulic press and 1000T mechanical press included in the said facilities.

- The construction of the press shop is examined by taking into consideration the domestic production large-sized press-worked parts to be produced domestically. Two different alternatives are studied for comparative examination in this connection; the decentralized alternative which consists of two new independent press shops for heavy vehicles and light vehicles respectively and the centralized alternative in which a new press shop is shared by both light vehicles and heavy vehicles.

The contents of the decentralized alternative and centralized alternative are mentioned in the following.

° Decentralized Alternative : Thin panels for light vehicles will be worked by installing anew a press shop in No.4 HI.

On the other hand, thick panels for light and heavy vehicles and thin panels for heavy vehicles will be worked in the new press shop of No.1 HI.

New No.1 HI press shop exclusively for heavy vehicles

Parts to be manufactured : Large-sized thin panels for heavy vehicles

Thick panels for heavy and light vehicles

Equipment : 8 units of 3000 ton - 50 ton press and other equipment

New No.4 HI press shop exclusively for light vehicles

Parts to be manufactured : Small-, medium- and large-sized thin steel plates for light vehicles

Equipment : 11 units of 1000 ton - 30 ton

° Centralized Alternative : Thin and thick panels for light and heavy vehicles will be worked at the new press shop of No.1 HI.

New No.1 HI press shop to be shared by both light and heavy vehicles

Parts to be manufactured : Large-sized thin panels for light and heavy vehicles

Thick steel plates for light and heavy vehicles

Small-, medium-sized thin steel plates will be worked in the existing press shop at No.1 HI.

Equipment : 8 units of 3000 ton - 50 ton press and other equipment

The most outstanding merit of the decentralized system is that for keeping good quality of thin panel, free of deformation and rust can be expected because long-distance transportation from No.1 HI press shop to No.4 HI assembly shop is not required any more. Furthermore, countermeasures to cope with any problem can be taken without delay because the body assembly shop is located adjacent to the press shop.

On the other hand, in some parts of this alternative redundant investment is unavoidable because a minimum equipment is required irrespective of the production volume. Moreover, the dispersion of personnel with technical skill is a negative factor from the stand points of maintenance and upgrading of the technical level.

The centralized alternative requires some special means of transportation besides careful control to realize smooth flow of the transportation and assembly process in view of long distance transportation from No.1 HI to No.4 HI.

The pallet must be adopted to cope with the deformation of thin panels and anti-corrosive protection is required to cope with corrosion during transportation and stock.

According to the above examination the centralized alternative is more adequate in view of capability to prevent dispersion of press technology and large-sized facilities and to realize improvement of technology, skill and productivity through concentration of these resources.

However, proper steps must be taken in this alternative to solve problems related to the maintenance of transportation facility and process control.

1) New Press Shop and Conveyance

The layout of the new press shop is shown in Attached Figure 2-1 and the list of the equipment to be installed therein is shown in Attached Table 2-1.

- Sketch layout of the New Press Shop

Such raw materials as blanks, steel plates and the like for press-working will be carried by truck and other means of transportation to the materials storage yard located at the left-hand side of the layout sketch. At that place they will be unloaded and conveyed by means of the 20T/5T overhead travelling crane. Simple blanking will be carried out by means 2 shears and bending is carried out by means of the press brake.

- The press shop building will be divided in 4 zones, A, B, C, D in the longitudinal direction. One unit of 25T/10T crane will be installed in the Zone A, one 5T crane will be installed in the Zone B, one 25T/10T crane and one 5T crane will be installed in the Zone C to take charge of the conveyance. The zone D will be equipped with one unit of 25T/10T crane and will be reserved for future expansions.

- The Zone A will house the sheet metal press line equipped with one unit of 1500T hydraulic press, one unit of 1000T mechanical press, and one unit of 500T mechanical press that will be shared for forming of external panels, forming of disks, and forming of rear axle of vehicles. These presses will be equipped with quick die changer. This line will be provided with spaces for storage of dice, part of machining facilities for welding and drilling, and also space for storage of semi-finished products.

- The Zone B will house the facilities to manufacture the rim side rings and the space to store them, the spaces to store the finished rims and disk wheels, the coating line facilities and the spaces to store the finished products. Since acid cleaning is required during the rim side ring forming process an acid cleaning area will be provided outside the press shop building.

- The facilities of the line for forming, coating and assembly of the main frames for heavy and light vehicles are installed in the Zone C.

  Since main frames of vehicles use steel plates thicker than external panels, an area for gas cutting of these steel plates will be provided at the beginning of the Zone C. Plasma cutting will be practicable when the method becomes ready for practical use. After the cutting process the main frame (chassis) of the heavy and light vehicles will be formed by means of the 3000T mechanical press. The main steps of material handling at this press will be carried out by means of such mechanical equipment as material feeder, product remover, etc., and the workers will take charge of subsidiary duties. Quick die changing equipment will be provided also with this press.

  The frames submitted to forming will be coated at the coating floor via dice storage area and semi-finished product storage area and will be assembled at the frame assembly line. The finished product will be carried out from the loading yard after being stored at the finished product storage area.

2) Construction of the New Press Shop Building

Executing the ordinary manufacturing work, including press work, at the second floor is an alternative taken into consideration to cope with floods during the rain season and to secure the dice storage area. The merits and demerits compared with the conventional first floor alternative are listed up in Attached Table 2-2.

- The first floor alternative consists of providing an embankment to elevate the work floor above the current ground level. The lower parts of the press will be housed underground.

  The second floor alternative consists of positioning the work floor 8 meters above the ground level for the lowest part of the press not to be located under the ground level.

- The second floor alternative has the advantage of preventing the manufacturing facilities from being affected by the water when the

interior of the plant is flooded due to improper drainage during the rain season but on the other hand it require hatches or rampways for transportation of trucks and materials because the work floor is elevated.

The dice storage area can be transferred to the first floor area. However, the construction cost becomes expensive because the building becomes tall (maximum height approximately 28 meters). The second storey floorboard, girders, columns and other structures must have solid construction to cope with the vibration of the equipment installed in the shop building.

- In the case of the first floor alternative, pits must be excavated down to approximately 8 meters beneath the work floor level to house the parts of the press located under the floor surface. Such being the case the pit must be lined with water proof mortar and furthermore drainage pumps must be provided to cope with emergency situations.

- When the first floor space is used to store dice and other items in the second floor alternative, openings will be required in the second storey press floor to hoist the dice and the like by means of cranes and the like and furthermore the first floor space can not be used effectively because of the many columns erected therein to secure the strength of the press floor. Such being the first floor space will not be so useful as a warehouse.

As can be seen, the second floor alternative has many demerits compared with the first floor alternative, because in addition to the requirement of larger construction space it involves more expensive construction cost. Such being the case, the first floor alternative is regarded as more recommendable in this study.

(3) Estimated Capital Requirement

1) Required Facilities

The details of equipment and devices required in the present plan are shown in the Attached Table 3-1.

2) Estimated Capital Requirement

The estimated amount of capital required is shown in the Attached Table 3-2. (Case 1 is for the present plan in one stage, Case 2 is an alternative plan in two stages. The following evaluation all concerns the one stage constructed plan.)

(4) Expected Effects of the Plan

The breakdown of the production costs (annual amounts) involved in the implementation of the present plan are shown in the Attached Table 3-3.

The comparison of the saving of foreign exchange by the production of the various items of the vehicle parts through implementation of the present plan is shown in Attached Table 3-4. None of the items can be expected to result in a saving of foreign exchange. Among others the disk wheel takes up 76% of the total foreign exchange outlay of 299.5 million yen.

The equipment to be introduced with the present plan is large compared to the production schedule and the equipment burden is therefore excessive. As the Attached Figure 3-1 shows a saving of foreign exchange can be anticipated to result if the production output is increased by approximately more than 33%.

By the implementation of the present plan the press related facilities will be strengthened and future export of press parts will become possible (in particular of the disk wheel). Further, a system for the production of parts directed internally to the company itself and vehicle parts for the general market, to other industries and directed to other Public Corporations will be possible. Therefore, since it is possible to reach these levels of production in the future from the

point of view of the future the implementation of the present plan is meaningful in the sense of establishing a foundation for the machine industry of Burma.

Attached Table 2-1 LIST OF MACHINERY AND EQUIPMENT FOR NEW PRESS SHOP

Remarks: (H) Hydraulic Press, (M) Mechanical Press

No.	A ZONE	No.	B ZONE	No.	C ZONE	No.	D ZONE
1	SHEARING M/C, 113 x 2000	1	COILER	1	SHEARING M/C, 16 x 6000	1	20/5 TON OVERHEAD CRANE
2	PRESS BRAKE, 200 TON	2	100 TON HORN PRESS (M)	2	25/10 TON OVERHEAD CRANE	2	30 TON TRAVERSER
3	1300 TON PRESS (H)	3	150 TON HORN PRESS (H)	3	3000 TON PRESS (M)	3	25/10 TON OVERHEAD CRANE
4	1000 TON PRESS (M)	4	FLASH BATT WELDING M/C	4	100 TON REFORMING PRESS		
5	500 TON PRESS (M)	5	FLAT TRIMMER	5	1.0 TON CRANE		
6	MATERIAL HANDLING EQUIP.	6	ROTARY TRIMMER	6	PRE-TREATMENT EQUIPMENT		
7	WASHING EQUIPMENT	7	COOLING EQUIPMENT	7	DIP. PRIMING EQUIPMENT		
8	MULTIPUL DRILL M/C	8	GRINDER	8	INFRA-RED OVEN		
9	GAS CUTTING M/C	9	SHRINKER	9	WELDING M/C		
10	GAS CUTTING M/C	10	300 TON PRESS (H)	10	RADIAL DRILLING M/C		
11	PLANER	11	FORMING ROLL M/C	11	HYDRAULIC RIVETER, 35 TON		
12	WELDING M/C	12	EDGE ROLLING M/C	12	HYDRAULIC RIVETER, 18 TON		
13	WELDING M/C	13	50 TON PRESS (H)	13	5 TON OVERHEAD CRANE		
14	GRINDING M/C	14	WELDING M/C				
15	25/10 TON OVERHEAD CRANE	15	WELDING M/C				
16	PICKLING EQUIPMENT	16	INSPECTING EQUIPMENT				
17	ELECTRIC SUBSTATION	17	PRE-TREATMENT EQUIPMENT				
18	AIR COMPRESSOR	18	PRINTING EQUIPMENT				
19	BOILER	19	TESTING EQUIPMENT				
		20	5 TON OVERHEAD CRANE				

Attached Table 2-2 COMPARISON OF THE NEW PRESS SHOP CONSTRUCTION ALTERNATIVES

	Merits	Demerits
First floor alternative	• The required construction cost is cheaper because the building can be made lower. • The transportation of the raw materials and finished products by means of trucks is easier.	• Pits must be excavated down to approximately 8 meters beneath the work floor level to house the parts of the press located under the floor surface. Such being the case the pit must be lined with waterproof mortar and furthermore drainage pumps must be provided to cope with emergency situations.
Second floor alternative	• The manufacturing equipment of various kinds including the presses are free of the risk of inundation during the rain season.	• The construction cost becomes expensive because the building becomes tall (maximum height approximately 28m). • Approximately 10% additional construction area is required in total compared with the first floor alternative, even when the dice storage area is arranged at the first floor, because of the rampways and forklift hatch for access of the transportation trucks.

Attached Table 3-1 LIST OF REQUIRED FACILITIES

#: 4-2(1) Construction of New Press Shop
- No.1 HI: # New Press Shop -

No	Items	Unit	No.
1	Bldg & Land		
A	Land		
B	Bldg		
	Matl's for build'g (asbestos cement slate&cement:not incl.)	Lot	1
2	Imported M/E		
1	Building for new press shop		
1 1	Auxiliary facilities (air compressor, piping matl's, etc.)	Lot	1
1 2	25/10 ton overhead crane w/materials	Set	3
1 3	20/5 ton overhead crane w/materials	Set	1
1 4	5 ton overhead crane w/materials	Set	2
1 5	1.0 ton crane w/materials	Set	2
1 6	30 ton traverser	Set	1
1 7	Electric materials (secondary substat'n, wiring matl's,etc.)	Set	1
1 8	Miscellaneous	Lot	1
2	ME for production of vehicle stamping parts (M-III-8-1)		
2 1	Press brake	Set	1
2 2 1	Handling equipment:portable belt conveyor	Set	1
2 2 2	Handling equipment:box pallet (for panel parts, matr'l only)	Set	1
2 3	Miscellaneous	Lot	1
2 4 1	Trimming dies for long stamping parts	Set	1
2 4 2	Tooling up for path finder	Set	1
2 4 3	Dies for T2000's box	Set	1
2 4 4	Dies & tools for T2000 cab	Set	1
3	ME for production of disc wheel		
3 1	Rim manufacturing line		
3 1 1	Coiler	Set	1
3 1 2	100 ton horn press (mechanical press)	Set	1
3 1 3	150 ton horn press (hydraulic press)	Set	1
3 1 4	Flash batt welding machine	Set	1
3 1 5	Rotary trimmer (for section steel bar)	Set	2
3 1 6	Flat trimmer (for rolled steel plate)	Set	1
3 1 7	Shrinker	Set	1
3 1 8	300 ton hydraulic press	Set	1
3 1 9	Forming roll	Set	2
3 110	Edge roll	Set	1

Attached Table 3-1 LIST OF REQUIRED FACILITIES

#: 4-2(2) Construction of New Press Shop
- NO.1 HI: # New Press Shop -

No	Items	Unit	No.
3 111	Cooling equipment	Set	1
3 112	Grinder	Set	3
3 113	Table lifter	Set	1
3 114	Hume collecting unit (for flatt butt welder)	Set	1
3 115	Dust collector (for grinder)	Set	3
3 116	Auxiliary equipment for line	Set	1
3 117	AC arc welding machine	Set	1
3 2	Disc manufacturing line		
3 2 1	1500 ton hydraulic press	Set	1
3 2 2	1000 ton mechanical press	Set	1
3 2 3	Multiple drill	Set	1
3 2 4	Auxiliary equipment for line	Set	1
3 3	Assembly line		
3 3 1	50 ton hydraulic press	Set	1
3 3 2	CO2 automatic welder	Set	2
3 3 3	CO2 semi-automatic welder	Set	1
3 3 4	Fume collecting fan	Set	1
3 3 5	Auxiliary equipment in line	Set	1
3 3 6	Tools for repairing	Set	1
3 4	Side ring line		
3 4 1	Sawing machine	Set	1
3 4 2	Auxiliary equipmet in line	Set	1
3 5	Pickling line		
3 5 1	Degreasing tank	Set	1
3 5 2	Pickling tank	Set	2
3 5 3	Water rinse tank	Set	1
3 5 4	Neutralizing tank	Set	1
3 5 5	Table lifter	Set	1
3 5 6	Auxiliary equipment in line	Set	1
3 5 7	Hoist crane	Set	2
3 6	Paint pretreatment line		
3 6 1	Degreasing tank	Set	1
3 6 2	Hot water rinse	Set	3
3 6 3	Phosphating tank	Set	1

Attached Table 3-1 LIST OF REQUIRED FACILITIES

#: 4-2(3) Construction of New Press Shop
- No.1 HI: # New Press Shop -

No	Items	Unit	No.
3 7	Painting line		
3 7 1	Under coating (dipping) equipment	Set	1
3 7 2	Finish coating (manual spraying equipment)	Set	1
3 7 3	Inspection equipment	Lot	1
3 8	Test equipment		
3 8 1	Life tester	Set	1
3 8 2	Drum tester	Set	1
3 8 3	Amslar tester	Set	1
3 8 4	Balancer	Set	1
3 8 5	Other test tools	Lot	1
3 9	Jig and dies		
3 9 1	Rim manufacturing dies	Set	1
3 9 2	Disc manufacturing dies	Set	1
3 9 3	Side ring manufacturing dies	Set	1
3 9 4	Assembly dies	Set	1
3 9 5	Inspection jigs	Set	1
310	Miscellaneous faciliteis for air & water, etc.		
310 1	Boiler	Set	1
310 2	Cooling water equipment:for air compressor	Set	1
310 3	Cooling water equipment:for production line	Set	1
310 4	Raw water treatment equipment	Set	1
310 5	Forklift truck 3.5 ton	Set	1
310 6	Forklift truck 2.5 ton	Set	1

Attached Table 3-1 LIST OF REQUIRED FACILITIES

#: 4-2(4) Construction of New Press Shop
~ No.1 HI: # New Press Shop ~

No	Items	Unit	No.
4	ME main frame production		
4 1	Shearing machine 6.0 ton x 6000	Set	1
4 2	Plusma cutter	Set	3
4 3	Material feeder and receiver	Set	2
4 4	3000 ton mechanical press	Set	1
4 5	Pre-treating equipment	Set	1
4 6	Infrared oven	Set	1
4 7	Dip priming equipment	Set	1
4 8	Arc welding machine	Set	4
4 9	100 ton reforming press	Set	1
410	Radial drilling machine	Set	2
411	Electric bench drilling machine	Set	2
412	18 ton hydraulic riveter	Set	1
413	35 ton hydraulic riveter	Set	1
414	Dies for main frame	Set	1
415	Assembling jigs	Set	1
416	Miscellaneous	Lot	1
5	ME rear axle housing production		
5 1	Press group		
5 1 1	Crank press, 500 ton	Set	1
5 1 2	Shearing machine, t13 x 2000	Set	1
5 1 3	Press dies	Set	1
5 1 4	Planer	Set	1
5 1 5	Washing equipment	Set	1
5 1 6	Semi automatic welding machine w/jig and tool	Set	2
5 1 7	Special gas cutting machine	Set	2
5 1 8	Special grinding machine w/jig	Set	1
5 1 9	Miscellaneous	Lot	1

Attached Table 3-2: REQUIRED INVESTMENT (#4-2)
Case 1: One-story Building Plan
(Unit: million yen)

	Items	Investment		
		Foreign	Local	Total
1	Bldg & Land			
A	Land	-	0.0	0.0
B 1	Building	2843.5	1709.8	4553.3
2	Freight & Insurance	270.1	-	270.1
	Sub-total	3113.6	1709.8	4823.4
3	Import Duty	-	467.0	467.0
4	Unloading	-	62.3	62.3
	Building Total	3113.6	2239.1	5352.7
	Bldg & Land Total	3113.6	2239.1	5352.7
2 1	Imported M/E (FOB)	10101.4	-	10101.4
2	Freight & Insurance	959.7	-	959.7
	Sub-total	11061.1	-	11061.1
3	Import Duty	-	1659.2	1659.2
4	Unloading	-	221.2	221.2
5	Installation Cost	-	6.4	6.4
	Imported M/E Total	11061.1	1886.8	12947.9
3	Local M/E	-	0.0	0.0
4	Other Costs			
A	License Fee	466.5	-	466.5
B	Eng Fee	367.2	-	367.2
C	Software	0.0	-	0.0
D	Interest	0.0	-	0.0
	Other Costs Total	833.7	-	833.7
	Total Investment	15008.4	4125.9	19134.3

Attached Table 3-2: REQUIRED INVESTMENT (#4-2)
Case 2: Two-stories Building Plan
(Unit: million yen)

	Items	Investment		
		Foreign	Local	Total
1	Bldg & Land			
A	Land	-	0.0	0.0
B 1	Building	4620.3	2040.6	6660.9
2	Freight & Insurance	438.9	-	438.9
	Sub-total	5059.2	2040.6	7099.8
3	Import Duty	-	758.9	758.9
4	Unloading	-	101.2	101.2
	Building Total	5059.2	2900.7	7959.9
	Bldg & Land Total	5059.2	2900.7	7959.9
2 1	Imported M/E (FOB)	10101.4	-	10101.4
2	Freight & Insurance	959.7	-	959.7
	Sub-total	11061.1	-	11061.1
3	Import Duty	-	1659.2	1659.2
4	Unloading	-	221.2	221.2
5	Installation Cost	-	5.8	5.8
	Imported M/E Total	11061.1	1886.2	12947.3
3	Local M/E	-	0.0	0.0
4	Other Costs			
A	License Fee	466.5	-	466.5
B	Eng Fee	367.2	-	367.2
C	Software	0.0	-	0.0
D	Interest	0.0	-	0.0
	Other Costs Total	833.7	-	833.7
	Total Investment	16954.0	4786.9	21740.9

Attached Table 3-3: PRODUCTION COST STATEMENT (#4-2)
Case 1: One-story Building Plan

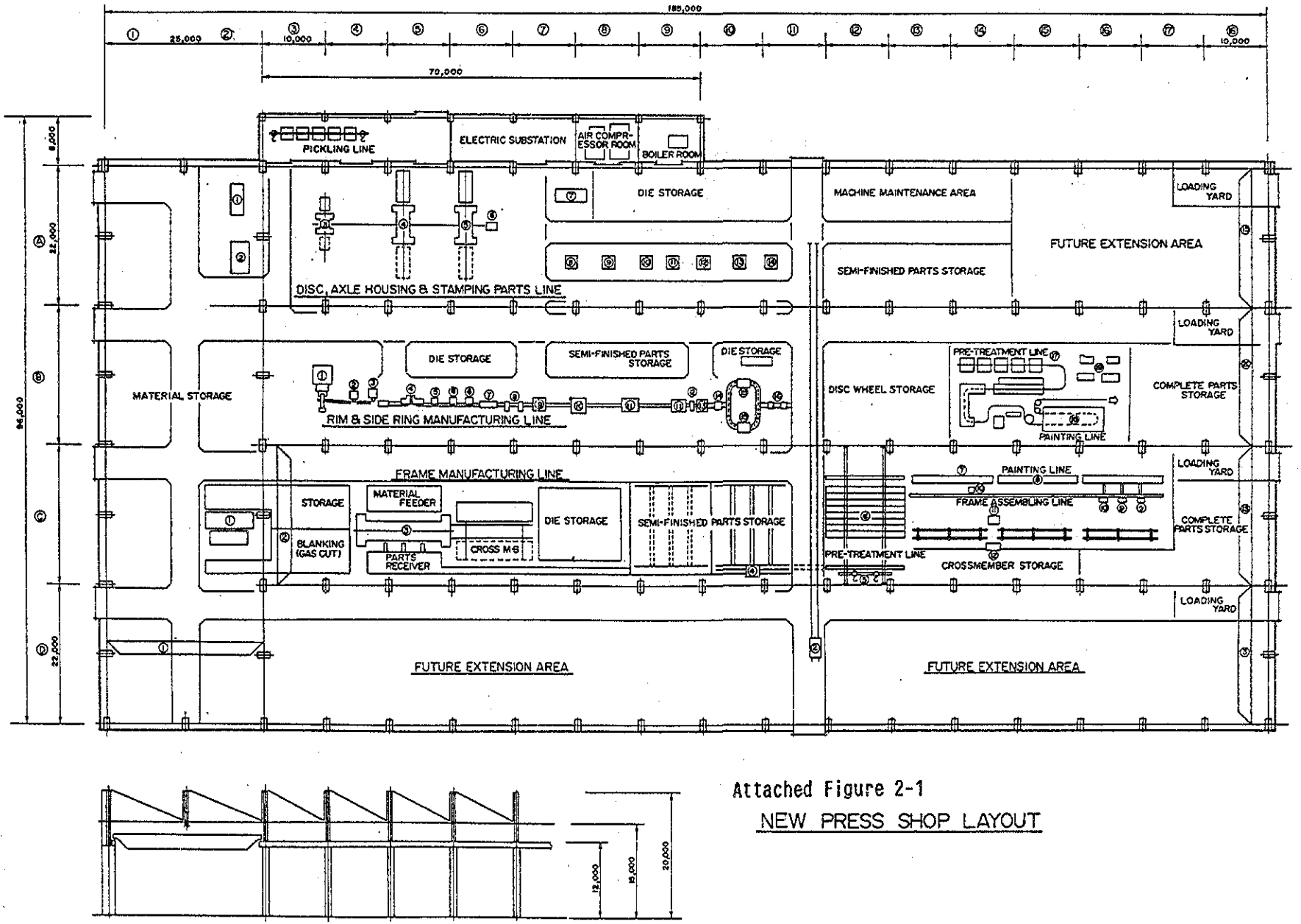
	Items	Annual Cost (million Yen) F/C	L/C	Total	Component (%)
1	CP/RM				
A	Imported CP/RM (FOB)	1055.6	-	1055.6	33
	Freight & Insurance	100.3	-	100.3	3
	Import Duty	-	173.4	173.4	5
	Unloading	-	23.1	23.1	1
	Sub-total	1155.9	196.5	1352.4	42
B	Local CP/RM	-	0.0	0.0	0
	CP/RM Total	1155.9	196.5	1352.4	42
2	Utilities	0.0	25.9	25.9	1
	Variable Cost	1155.9	222.4	1378.3	43
3	Depreciation	788.1	182.6	970.7	30
4	Amortization	0.0	-	0.0	0
5	Maintenance	425.2	107.9	533.1	17
6	Design Fee	0.0	-	0.0	0
7	Labor	-	12.6	12.6	0
8	Ovehead	-	149.8	149.8	5
9	Admin.Cost	-	143.5	143.5	5
	Fixed Cost	1213.3	596.4	1809.7	57
	Annual Cost	2369.2	818.8	3188.0	100
	Unit P.Cost				
10	Mark-up				
11	Excise Tax				
	Ex-fact.Cost				

Attached Table 3-3: PRODUCTION COST STATEMENT (#4-2)
Case 2: Two-stories Building Plan

	Items	Annual Cost (million Yen) F/C	L/C	Total	Component (%)
1	CP/RM				
A	Imported CP/RM (FOB)	1055.6	-	1055.6	31
	Freight & Insurance	100.3	-	100.3	3
	Import Duty	-	173.4	173.4	5
	Unloading	-	23.1	23.1	1
	Sub-total	1155.9	196.5	1352.4	40
B	Local CP/RM	-	0.0	0.0	0
	CP/RM Total	1155.9	196.5	1352.4	40
2	Utilities	0.0	25.9	25.9	1
	Variable Cost	1155.9	222.4	1378.3	41
3	Depreciation	866.0	195.8	1061.8	32
4	Amortization	0.0	-	0.0	0
5	Maintenance	483.6	117.8	601.4	18
6	Design Fee	0.0	-	0.0	0
7	Labor	-	12.6	12.6	0
8	Ovehead	-	158.1	158.1	5
9	Admin.Cost	-	151.4	151.4	5
	Fixed Cost	1349.6	635.7	1985.3	59
	Annual Cost	2505.5	858.1	3363.6	100
	Unit P.Cost				
10	Mark-up				
11	Excise Tax				
	Ex-fact.Cost				

Attached Table 3-4 : Foreign Exchange Saving by Domestic Production of Press Parts

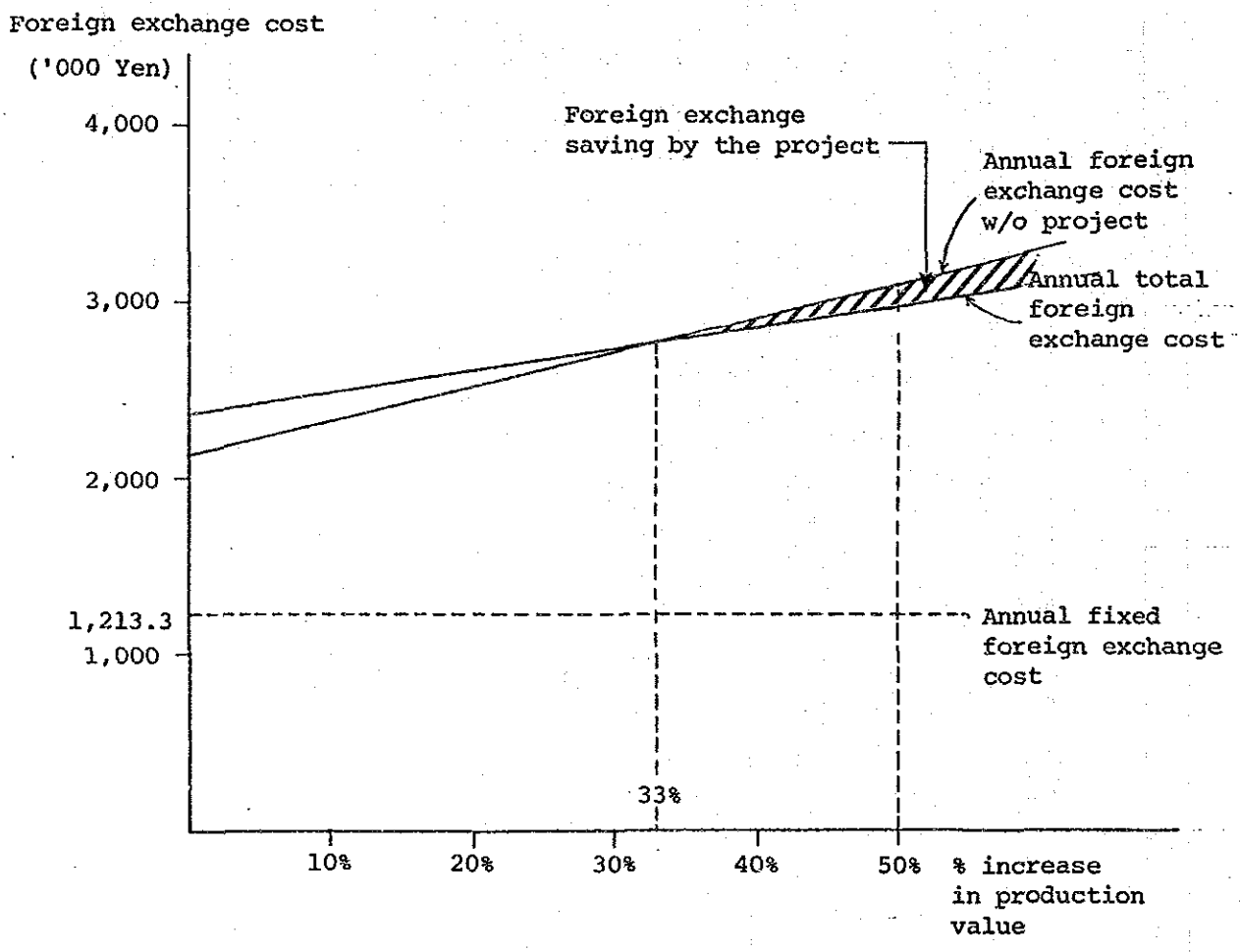
No	Vehicle Type	Items	Unit Import Price (¥) (A)	No of Parts/ Required Vehicle (B)	No of Vehicle Produced (Units) (C)	Annual Prd'n of Parts (Pcs) (D)	Cost w/o Project Annual F.E Cost (¥'000/yr) (E)	Cost w/ Project(in 1998) Unit F.E Cost (¥) (F)	Annual F.E Cost (¥'000/yr) (G)	Annual RM Costs (¥'000/yr) (H)	Annual Foreign Exchange Saving (E-G)
1	B-600	R Axle Hous'g	7070	2.0	800	1600	11312	8093	12949	9989	-1637
2	x-2000	R Axle Hous'g	6035	2.0	800	1600	9656	6900	11053	8459	-1397
		Disc wheel	3870	6.5	800	5200	20124	4430	23036	17629	-2912
		Panel side	16352	2.0	800	1600	26163.2	18718	29949	22919	-3786
		Side frame	48680	1.0	800	800	38944	55724	44579	34115	-5635
		Radiator	9220	1.3	800	1040	9588.8	10554	10976	8400	-1388
3	T-2000	R Axle Hous'g	24720	1.0	600	600	14832	28297	16978	12993	-2146
		Disc wheel	4170	6.5	600	3900	16263	4773	18616	14246	-2353
		Roof cabin	2034	1.0	600	600	1220.4	2328	1397	1069	-177
		F cvr cabin	2674	1.0	600	600	1604.4	3061	1837	1405	-232
		R cvr cabin	2234	1.0	600	600	1340.4	2557	1534	1174	-194
		F const part	29029	1.0	600	600	17417.4	33230	19938	15258	-2520
		Panel side	16315	2.0	600	1200	19578	18676	22411	17150	-2833
		Side frame	51100	1.0	600	600	30660	58494	35097	26858	-4437
		Door panel	5502	2.0	600	1200	6602.4	6298	7558	5784	-955
		Floor board	4450	1.0	600	600	2670	5094	3056	2339	-386
		Radiator	14220	1.3	600	780	11091.6	16278	12697	9716	-1605
4	TE-21	R Axle Hous'g	62673	1.0	950	950	59539.35	71742	68155	52156	-8616
		Disc wheel	154000	9.1	950	8645	1331330	176284	1523977	1166245	-192647
		Roof cabin	3640	1.0	950	950	3458	4167	3958	3029	-500
		F cvr cabin	3640	1.0	950	950	3458	4167	3958	3029	-500
		R cvr cabin	3640	1.0	950	950	3458	4167	3958	3029	-500
		F const part	3640	1.0	950	950	3458	4167	3958	3029	-500
		R const part	3640	1.0	950	950	3458	4167	3958	3029	-500
		Bonnet	3640	4.0	950	3800	13832	4167	15834	12117	-2002
		Fender	3640	2.0	950	1900	6916	4167	7917	6058	-1001
		Side frame	100078	1.0	950	950	95074.1	114560	108832	83285	-13758
		Door panel	3640	2.0	950	1900	6916	4167	7917	6058	-1001
		Floor board	3640	1.0	950	950	3458	4167	3958	3029	-500
		Radiator	38920	1.3	950	1235	48066.2	44552	55022	42106	-6955
5	BX-402	R Axle Hous'g	62673	1.0	150	150	9400.95	71742	10761	8235	-1360
		Disc wheel	154000	9.1	150	1365	210210	176284	240628	184144	-30418
		Roof cabin	3640	1.0	150	150	546	4167	625	478	-79
		F cvr cabin	3640	1.0	150	150	546	4167	625	478	-79
		R cvr cabin	3640	1.0	150	150	546	4167	625	478	-79
		F const part	3640	1.0	150	150	546	4167	625	478	-79
		R const part	3640	1.0	150	150	546	4167	625	478	-79
		Bonnet	3640	1.0	150	150	546	4167	625	478	-79
		Fender	3640	1.0	150	150	546	4167	625	478	-79
		Side frame	100078	1.0	150	150	15011.7	114560	17184	13150	-2172
		Door panel	3640	3.0	150	450	1638	4167	1875	1435	-237
		Floor board	3640	1.0	150	150	546	4167	625	478	-79
		Radiator	38920	1.3	150	195	7589.4	44552	8688	6648	-1098
						51,710	2,069,707	45817	2,369,280	1,813,064	-299,493



Attached Figure 2-1

NEW PRESS SHOP LAYOUT

Attached Figure 3-1 CHANGE IN FOREIGN EXCHANGE SAVING VS PRODUCTION VALUE, NEW PRESS SHOP PROJECT



#4-3 Build-up of Foundry Capacity
- No.3 HI: Foundry -

(1) Objectives and Outline of the Plan

- The foundry assumes the role of supplier of raw material of vehicles (heavy and light vehicles), agricultural machinery, electrical appliances, etc. The supplying of cast parts for manufacturing these products is on the upstream of the manufacturing process, and although these raw materials must be of quality and be supplied with good timing for the next processing step, the present state is such that actual production considerably underruns the planned production. Problems such as delay of delivery period and inferiority of quality are also being pointed out by the machining function and assembly function. It is necessary to establish an effective supply system of cast parts with acceptable quality but without delay in supply.

- The production plan for the coming ten-year period includes the increased production. This will naturally require increased production of also cast parts produced now. To cope with increased demand it will be necessary to strengthen the production capacity.

- The modernization plan calls for local production of certain parts which have been imported so far. Exhaust manifold, differential carrier, cylinder liner are a few of examples of the cast parts that are being planned for local production for which it is necessary to establish a production system.

- To locally produce products, Burma must import a considerable amount of component parts from abroad, but in the case of cast parts, it will be able to produce them by using locally produced raw materials to a large extent. For instance, steel plate scraps internally generated at HIC are available, and sand for molding can be locally procured. Burma's high local procurement ratio with respect to raw materials is advantageous in terms of both production management and product cost. Casting can be supplied as they are to other corporations in Burma, and as they have a high export potential, they should be able to play an important role in earning foreign

currency. To attain these goals, it is necessary to establish a sound production system in terms of quality, production cost and delivery schedule.

For increased production of castings as above, it is necessary to increase the production capacity of foundry by upgrading and expanding its facilities. The aim of this project is to establish a system for expansion of production as above. The foundry production plan is as per Attached Table 1-1. Compared to the current planned production of 3,600 tons/year, the production plan after 10 years from now is more than double the current level, or about 7,800 tons/year.

Attached Table 1-1 PRODUCTION PLAN OF FOUNDRY

Description	Present Products (t/y)	Future Expansion (t/y)	Total Products (t/y)	Line
Heavy Vehicle	786	700	1,486	A & B
Agricultural Machinery	1,480	20	1,500	A & E
Light Vehicle	590	1,180	1,770	C
Machine Tool	250	200	450	A & B
General Eng. Products	150	50	200	E
Export Parts	300	2,000	2,300	A
Electric Motor	44	40	84	A & E
Total	3,600	4,190	7,790	

The existing foundry has four molding lines, namely, A line, B line, C line and E line. Besides these, it also has a shell molding D shop. The characteristics of each line are as follows.

A Line : Greensand molding line
Producing mass production items by semi-automatic molding machine and also parts for agricultural machinery, parts for heavy vehicle and export castings.

B Line : Self-hardening molding line
Producing parts for heavy vehicle (especially engine block).

C Line : Shell molding line
Producing parts for light vehicle in the main and also some parts for agricultural machinery.

E Line : Greensand molding line, and cement molding (old foundry)
Producing electrical (motor) parts, parts for machine tool, export castings, etc.

D Shop : Shell molding, shell core molding
Producing molds and cores by shell molding machine, mainly for light vehicle parts and also for some agricultural machinery parts.

The present planned production quantities and the production plan after expanding production of each molding line required to digest the aforementioned production plan are shown in Attached Figure 1-1.

Facilities, technology, and production management must be strengthened in one way or another to attain the foregoing production targets.

Attached figure 1-2 shows the forecast trend of production quantity of cast parts for the next 10 year period. As the growth of production quantity will start rising sharply from the middle of the period (after five years), it is necessary to complete the production system by that time.

Cast parts to be produced by each molding line after expanding production are outlined as follows.

Line	Line Characteristics	Product Line (Production Increase and Conversion to Local Production)
A Line	Mass production of medium and small sized castings by greensand molding	- Parts for heavy vehicles (truck) - Parts for agricultural machinery - Parts for small machine tool - Castings for export - Parts for local production (example) * Differential case * Exhaust manifold * Generator parts
B Line	Parts not produced in large quantities, by self-hardening mold	- Parts for heavy vehicle (engine block) - Parts for machine tool - Parts for motor - General engineering castings - Parts for local production (example) * Differential carrier
C Line	Precision castings by shell molding	- Parts for light vehicle - Parts for agricultural machinery - Parts for local production (example) * Exhaust manifold * Crank shaft * Differential case
E Line	Mass produced small castings by greensand molding and large sized castings by CO_2 sand molding	- Parts for small agricultural machinery - Parts for pump - Parts for motor - Parts for large machine tool - Parts for local production (example) * Water pump (for vehicle) * Pully (for vehicle) * Small motor case

Note: Cylinder liner which will be produced at the new foundry by the centrifugal casting method, and aluminium piston and piston ring which will be produced at the light alloy foundry are excluded from above table as those will be studied separately.

To attain production of the planned quantity by assigning each molding line with its respective share of production, it would be necessary not only to upgrade the facilities of each line but those of the material stock yard and melting equipment and streamline the fettling/finishing yard of castings so that the foundry as a whole will consist of well balanced functions.

To attain these plans, the following must be implemented.

- Repair and replacement of present facilities, elimination of bottlenecks, inducement of conveying facilities.
- Expansion of production capacity by enlarging the material stock yard and installing additional melting furnace (including material charging system and returned material sizing facilities)
- Expansion of production capacity by overall renovation of the old foundry (E Line)
- Expansion of after-processing capacity by streamlining the fettling/finishing yard (including rust preventive treatment of castings)
- Expansion of C Line's casting capacity by repairing and expanding the Line's facilities.
- Remodelling of A Line to expand its capacity
- Remodelling and changing of the process of B Line to expand its capacity

(2) Details of the Plan

1) Steps for Improvement and Expansion of Facilities

In implementing the proposed project, it is necessary to expand the molding capacity of each line, but as this must be done without disrupting production, the facilities shall be expanded according to the following steps. (However, expansion of some functions may be made simultaneously.)

- First of all, the existing facilities shall be improved. A lot of heavy articles must be conveyed within the foundry, but as the existing foundry hardly has any conveying facilities, these must be induced in order to raise production efficiency. Inadequate capacity of the compressor as a power source must be corrected in order to normalize operation of facilities.

- A small scale material stock yard exists inside the foundry now, but a new material stock yard including a scrap yard, facilities for charging the charging bucket with materials, sizing facilities for scraps will be constructed between the generator/motor shop and the foundry. The space vacated within the foundry will be used as a stock yard of cast products. This will be implemented under the rationalization project of cast product finishing yard which will be described later. As the charging system of raw materials and the conveying system up to the melting furnace are closely related, expansion of melting facilities will be planned simultaneously.

- The entire facilities of the old foundry will be remodelled. As existing facilities are remarkably old and deteriorated, new molding line will be set up and a series of facilities including sand treatment equipment will also be induced. A part of production during remodelling of the lines will be carried out on A line and B line.

- The core making yard of B line will be relocated to the core making yard of the old foundry after remodelling. The vacant space after evacuation of the core making yard is planned to be utilized as an intermediate product stock yard in the project for rationalizing the finishing yard for castings which will be discussed later.

- The fettling/finishing yard of castings will be streamlined. Improvement of finishing work on castings, product inspection facilities, inducement of equipment for rust preventive treatment of castings, etc. will be dealt with in the overall plan for the fettling/finishing yard of castings.

- Some additional shell molding machines will be installed in D shop for C line. If it is to be installed after remodelling the old foundry, the work may be executed in parallel with the improvement of other lines.

- A line will be remodelled, mainly by inducing cope roll-over device and changing metallic flask, to expand production capacity. During remodelling of this line, small articles will be transferred to E line as much as possible, and some parts of the balance will be transferred to B line.

- B line will be remodelled and the molding process changed. The change in process on B line will only be applied to the mold for the time being. The core making yard of B line will be relocated to a part of the old foundry after remodelling to improve working environment. The evacuated core making yard will be effectively utilized as a part of the fettling/finishing rationalization plan.

2) Contents of Each of the Measures to Realize Increased Production

a) Improvement of Present Facilities

As stated already, casting production is planned to be increased from 3,600 tons/year to 7,800 tons/year. To attain this, present facilities must be improved by replacing shot blasting machine and other old facilities, eliminating bottlenecks such as insufficient capacity of compressor and inducing conveying facilities to convey raw materials and products.

Regarding compressors of the foundry, the operating air pressure within the foundry is generally declining due to diversion of shop air to other adjacent shops (AME No.1 and the light vehicle forging shop). The necessary air pressure is normally around 6 kg/cm2 but it occasionally drops to around 4 kg/cm2, which lowers the molding capacity and also causes casting defects originating from faulty molds.

The compressor capacity of present foundry is as follows.

	Necessary Air Volume	No. of Compressors
- Foundry (except C line)	18.9 Nm3/min	75 kW x 2 sets
- Old foundry and C line	10.0 Nm3/min (Presumption)	75 kW x 1 set

The additional air volume required in conjunction with the proposed modernization plan is as follows.

	Necessary Air Volume
- Enlargement of material stock yard/capacity expansion of A line	5.2 Nm^3/min
- Overall remodelling of old foundry	9.5 Nm^3/min
- Process change of B line	1.4 Nm^3/min
- Rationalization of fettling/ finishing yard	1.5 Nm^3/min
Total	17.6 Nm^3/min

Shop air from the compressor planned in this project will be supplied to the entire foundry and also to AME No.1, while the forging shop will have its own compressor installed. Shop air consumed by AME No.1 is assumed to be 30% (5.7 Nm^3/min) that of the foundry (except C line and old foundry).

Accordingly, the shortage of shop air will be 23.3 Nm^3 (= 17.6 + 5.7).

One additional compressor with the rated capacity of 150 kW will be installed to cover the foregoing shortage of capacity.

b) Enlargement of Raw Material Stock Yard and Installation of Additional Low Frequency Induction Melting Furnace

- The space for stocking raw materials for melting which now exists in the back of the electrical room of existing low frequency induction furnace is extremely small, being only 18 m x 5 m.

  Since it would be impossible to enlarge the raw material stock yard within the available space of present foundry, it is desirable to set up a new one in the space between the generator/motor shop (AME No.1) and the foundry. The raw material stock yard will be divided into three shops, one as the stock yard of scrap materials, the second as the automatic material charging facility, and the third, sizing facility of returned materials.

- Scrap material stock yard will be partitioned by type of materials with concrete bunker. In other words, it will manage

melting raw materials by classifying them into returned casting scraps, pig iron, steel scraps, punched forging scraps, turning chips, etc.

- Automatic material charging equipment not only dispenses the proper quantity of raw materials for melting from the storage, but weighs and blends them as well for feeding into the charging bucket. The charging bucket is carried by a specialized monorail up to the top to the melting furnace and feeds the raw materials into the furnace. Accordingly, it is desirable that the project for material stock yard facilities and installation of the new electric furnace will be implemented at the same time.

- There is no sizing facility for returned materials yet. Therefore, it is considered necessary to install sizing facilities to recover and reuse medium and large sized returned castings and punched forging scraps for the following reasons.

Principal raw materials used in producing castings are pig iron, steel scrap, returned castings, etc. The mixing ratios of these materials differ depending on the quality of castings demanded, but generally, returned cast iron material is used in the ratio of between 20 to 50%, which is procured by recovering and using riser, sprue, runner and defective castings generated within their own shop.

As for recovery of internally generated materials, small ones can be recovered and used as they are and HIC's foundry naturally does this, but medium and large sized castings cannot be charged into the melting furnace as they are, and are therefore abandoned.

As the existing 3 ton low frequency induction furnace has the crucible diameter of 700ø, charging materials smaller than this diameter can be charged into the furnace as they are. It is desirable, however, to make the size of charge materials about 1/3 of the mouth diameter of the furnace in order to save electric power and to prevent oxidation loss and change of property of molten metal. Many of the castings which HIC's foundry recovers

and uses are small in size as they are mainly for vehicles and agricultural machinery, and the foundry also produces engine blocks for heavy vehicles and castings for machine tools such as large lathe, these can not be recovered and reused unless they are first crushed somehow.

If yield of casting rises and defective ratio falls by the improvement in casting technology in the future, it would naturally lead to a greater need to recover and reuse defective large castings. In order to recover and recycle those materials, crushing equipment must be induced.

Punched forging scraps must be sorted into carbon steel and special steel at the generating shop and separately stocked in scrap boxes. When certain quantities have been accumulated, these will be piled up in their respectively designated partitioned block within the foundry's scrap yard.

Of the punched-out forging scraps, those with connecting frames like the punched blanks for hoes are not used very much now as they are bulky and the required weight can not be charged into the charging bucket.

In order to effectively utilize those punched-out forging blanks, it is necessary to press them into block form or cut them into small pieces.

- Regarding installation of an additional melting facility, its relevancy with the material charging facility has already been stated in the section on the latter facility. The melting facility is to supply molten metal mainly to molding A line and will be installed opposite to A line. The current facility consists of three sets of 3 ton low frequency induction furnaces (with three power sources). As the planned increase in production can not be coped with the existing facility, an additional 3 ton furnace will be installed to make the facility consist of four sets of 3 ton furnaces (with four power sources). (As a standby unit, one furnace body only has already been delivered.)

c) Capacity Expansion by Overall Remodelling of the Old Foundry

The old foundry produces small articles by using small jolt-squeeze molding machines. This molding machine however is considerably old, and as the sand control facilities are also imperfect, quality and productivity of casting are remarkably low. Meanwhile, castings for large machine tools are produced by the cement-sand molding method but these are highly defective, having such defects as sand inclusion, blow holes, etc. and the defective ratio of defects is as high as 50%. There is a Fulmina furnace (fuel oil fired rotary furnace) for melting which is not used now. Actual production in 1987 was 242 tons/year, which is a large decline in productivity compared to the design production capacity.

The production program under the modernization plans proposed at this time called for the production capacity of about 1,500 tons/year, which necessitate overall improvement of the equipment. Production of small castings which are now produced on A line as well as production of cast parts for motors and agricultural machinery will be transferred to this line as much as possible. To accomplish this, a new automatic flaskless molding machine will be induced to organize a molding line. Also, foundry sand mulling and feeding equipment and a series of facilities which can continuously perform fettling/finishing of castings such as cooling, separation of foundry sand, shot blasting and separation of return materials will be induced.

For melting, two sets of 3 ton low frequency induction furnace will be installed in place of the current Fulmina furnace to also cope with increased production of castings on C line.

To replace the conventional cement-sand molding method, either the CO_2 method or VRH-CO_2 method (Vacuum Replacement Hardening CO_2 Process) will be induced. The new method will be applied to the cast parts for large machine tools. As sand treatment facilities, a simple sand treatment plant including reclamation equipment of CO_2 sand and sand mixer will be induced. To produce large castings, the present 5 ton crane is inadequate in capacity. It

is necessary to induce cranes of around 10 tons in capacity and reinforce columns and girders.

d) Rationalization of Fettling/Finishing Yard and Rust Preventive Treatment of Castings

There is a fettling/finishing yard for castings with a space of 20 m x 110 m in the back of the molding shop of foundry. This fettling/finishing yard currently performs finishing work of more than 2,000 tons/year of castings (actual for 1987), but according to the modernization plan, it must digest about 7,800 tons a year. As it stands now, a considerable space of the work yard is occupied by products due to poor planning and shortage of material handling equipment. Therefore, in order to cope with the drastic increase in future production, a drastic rationalization plan including the automation of some grinders is necessary besides extending the work hours by adopting a two-shift system. In order to cope with increased production, a more rational use of the fettling/finishing yard is necessary. Products handled at this fettling/finishing yard are diverse, ranging between 0.2 kg to 300 kg a piece in size, so that it would be difficult to find a solution based on the idea of dealing with a single kind of product. Accordingly, the process yard will be divided into about three blocks, each to be provided with a processing line suitable for each respective product.

For the stock yard of intermediate products, the space that will become available after relocating the pepset core making yard (the core making yard to be set up after the remodelling of the old foundry) will be used.

For the stock yard of final products, a simple multi-shelf warehouse will be built on the space currently used as the melting material stock yard which will be vacated when the new raw material stock yard is set up.

For finishing on the grinder, the relatively inexpensive automatic grinder for round products will be installed in addition to the currently used one. It will become possible to finish flywheels and manhole covers more efficiently by this.

As some ductile iron products are included among the castings that are planned to be locally produced, the present annealing furnace will be remodelled to be able to cope with them, at which time the control method of furnace temperature will also be changed to a new one.

The product inspection yard will be enlarged as a part of quality control on castings. Facilities to be added are the basic marking-off tools and measuring instruments.

The proposed project will not include the three-dimensional measuring instrument which is expensive and difficult to operate, inspect and maintain and the digital display measuring instrument which is also difficult to maintain.

At the grinding workshop in the fettling/finishing yard where the work environment becomes poor due to dust generated by the grinder, a booth for the grinder will be provided from where air will be exhausted by propeller fan.

For moving and carrying products, an additional 2-ton suspension crane similar to the existing one will be installed, and the crane rail will also be extended.

At present, rust-preventive coating is applied only to products on the shell moulding line (cast parts for light vehicles). As requests for rust-preventive coating have been submitted by the agricultural machinery and heavy vehicle production functions, new rust-preventive coating facilities will be installed.

If all of the castings are to be coated, however, the facilities would become too large and lead to a cost increase and shortage of space. Also, as rust-preventive coating is unnecessary for some products, it would be necessary to narrow down the applicable products to some extent.

As coating facilities, the plant at Mamootie (hoe) painting shop may be utilized, although it would depend on the frequency of use.

Booth and propeller fan will be provided for ventilation of said rust-preventive coating facilities.

e) Expansion and Upgrading of C Line (Shell Molding Line)

C line mainly produces cast parts for light vehicles and also some parts for agricultural machinery by the shell molding method. Major cast parts are engine block, cylinder head, crank shaft, etc. The production quantity of these was 282 tons in 1987, which is less than half the planned production quantity. Among the existing facilities, troubles with the shell molding machine, and deteriorated sand recovery facilities which often breakdown are hampering production.

The installed production capacity is estimated to be 600 tons/year which is inadequate to cope with the planned future production of 1,770 tons/year. The existing shell molding capacity is insufficient to meet the planned production increase including the production of 2,000 cc engine so that new shell molding machines must be installed. The capacity of the existing melting facilities is also short but this can be coped with by receiving the supply of molten metal from the low frequency induction furnaces (3 ton x 2 sets) which will be installed at the time of remodelling the old foundry.

f) Expansion of Casting Capacity of A Line

The planned production quantity of A line for 1987 was 2,308 tons, but the actual production was 1,233 tons. One of the reasons that hampered production was the fall in molding capacity due to shortage of shop air thus insufficient pressure which produced faulty molds and turned out products of dissatisfactory quality.

It is necessary to eliminate these bottlenecks, but repairing of the line alone would not be enough for A line to meet its share of planned production increase of 3,500 tons/year called for in the modernization plan.

A line consists of only one line now and production will be carried out on this line without adding another line, but it is necessary to change a part of its configuration. Castings being produced at the foundry now have somewhat changed since the time of its establishment, and considering that some of the parts are to be locally produced and that some may be exported in the future, it would be necessary to remodel the line to cope with anticipated changes. In other words, certain castings required setting of a core to the cope, for which the installation of a core roll-over device is desirable both in terms of required man-hours and quality confirmation. The currently used metal flask which even a slight difference of size would slash down the production of cast parts by half would have to be replaced with a larger sized one that can produce cast parts for new equipment models and also produce ductile iron cast parts for heavy vehicles (parts planned for local production in the future) which require a deeper cope flask than the presently used one.

These measures would increase the quantity molded, increase the molding speed, and stabilize mold quality to meet the demand for increased production.

g) Increased Production and Change in Process of B Line

B line is producing cylinder blocks of trucks for heavy vehicles. Actual production in 1987 was 263 tons. This molding line was exclusively designed for production of cylinder block (for heavy vehicles), and if only this product is produced, the line has the installed capacity to produce about 800 tons per year. Accordingly, in order to meet the call for increased production, the main product of this line should be cylinder blocks, besides which it will also produce cast parts for machine tools and general engineering cast products. Of these, cast parts for large machine tools will be produced on the molding line of the old foundry after remodelling while medium sized cast parts will mostly be produced on B line except mass produced medium/small sized cast parts which will be produced on A line. In terms of facilities, partial replacement and upgrading of sand treatment facilities, replacement of core facilities, and inducement of equipment involved in the

VRH-CO_2 process (Vacuum Replacement Hardening CO_2 Process) which is mentioned later would be necessary to achieve the increased production target, but for the most part, the existing facilities can be diverted and remodelled.

Foundry layout after remodelling is shown in Attached Figure 2-1.

(3) Estimated Capital Requirement

1) Required Facilities

The detailed list of machine and equipments required in the present plan is shown in Attached Table 3-1.

2) Estimated Capital Requirement

The estimated capital requirement is shown in Attached Table 3-2.

(4) Expected Effects of the Plan

1) Foreign Exchange Saving

If cast parts is imported without implementing the present plan, the cast parts costs 163,072 yen/ton. In other words, import of one ton of cast parts results in 163,072 yen of foreign exchange outflow. Therefore, domestic production of one ton of cast parts contributes to 88,487 yen of foreign exchange saving as shown below. (Assumed production increase: 5,400 tons/year)

	Foreign Currency Required at Implementation of Plan (yen per ton)	Foreign Currency Required for Import (yen per ton)
Cost of parts	-	148,247
Raw Material Costs	44,474	-
Freight & Insurance	4,449	14,825
Sub-total	48,923	163,072
Working equipment costs	17,769	-
TOTAL	66,692	163,072

Note: The working equipment costs are only for the additional costs incurred by this plan. For detail, see Attached Table 3-3.
Casting material costs is assumed 30% of cost of parts.

2) Production Cost Reduction

A comparison of production costs for one ton at present and after the implementation of the present plan is as follows;

	Production Costs After Implementation of the Plan	Present Production Costs
Imported CP/RM costs		
FOB price	44,474	44,474
Freight & insurance	4,449	4,449
Sub-total	48,923	48,923
Local CP/RM costs	63,615	63,615
Depreciation	70,722	113,991
Utility costs	6,556	13,595
Labor costs	1,000	2,252
Overheads	12,407	13,554
Admin. costs	11,630	12,909
Other costs	43,670	15,800
Sub-total	209,600	235,716
Mark-up, profit	-	-
Excise tax	-	-
TOTAL	258,519	284,639

Note: Present production cost is the actual cost in 1987 with 3,400 tons of melting quantity and 2,400 tons output. Production after implementation of the plan is 7,800 tons output/year.
Thus, the implementation plan contributes to 72,511 yen/ton of production cost reduction. the detail of production cost is given in Attached Table 3-3. The relationship between production volume and production cost is shown below.

Thus, the implementation plan contributes to 26,120 yen/ton of production cost reduction.

The detail of production cost is given in Attached Table 3-3. The relationship between production volume and production cost is shown below.

& change in annual production	Annual production (ton/year)	Unit production cost (yen/ton)
-40%	3,240	398,247
-20%	4,320	310,917
Base	5,400	258,519
+20%	6,480	223,586
+40%	7,560	198,635

3) Number of Years Required for Recovery

The foreign capital investment on the present plan is expected to be recovered in 3.9 years, as shown in the following formula.

(The number of years required) = A/(B x C)

Where,

(A) = Estimated foreign exchange required (1,859.9 million yen)

(B) = Foreign exchange saving per item (26,120 yen/ton)

(C) = Annual production (5,400 ton/year)

4) Other Effects Expected from the Plan

The following effects are anticipated from implementing the present plan:

1. Increase in production capacity
2. Possibility to maintain the output quality at acceptable level
3. Formulation of basis for future export of cast products/parts

Attached Table 3-1 LIST OF REQUIRED FACILITIES

#: 4-3(1) Increase of Casting Capacity
- No.3 HI: Foundry -

No	Items	Unit	No.
1	Bldg & Land		
A	Land		
B	Bldg		
2	Imported M/E		
1	Repair/replace deteriorated M/E		
1 1	Replace shot blast		
1 1 1	Table type shot blasting machine	Set	1
1 1 2	Dust collector with duct	Set	1
1 2	Additional air compressor		
1 2 1	1 x 150kW air compressor	Set	1
1 2 2	1 x afrer cooler, etc.	Set	1
1 2 3	Other machines & equipment	Set	1
1 3	Transp & mat'l handl'g eqpt		
1 3 1	Crane truck	Set	1
1 3 2	Fork lift truck:cap. 5,000kg	Set	1
1 3 3	Fork lift truck:cap. 2,000kg	Set	4
1 3 4	Battery powered fork lift truck:cap. 1,000kg	Set	1
1 3 5	Shovel loader for the handling of sand	Set	1
1 3 6	One wheel truck for the transportation of sand:cap. 100kg	Set	5
1 3 7	Trailer for the transportation of various matters	Set	5
1 3 8	Hand pallet truck for the transportation of pallets	Set	15
1 3 9	Hand truck for the transportation of various matters	Set	10
1 310	Hand truck for the transportation of core pallets	Set	10
1 311	Drum handling truck	Set	2
1 312	Gas cylinder handling truck for the transportation	Set	1
1 4	Repair/replace shell mold M/C		
1 4 1	Bucket conveyer for shell molding M/C	Set	1
1 4 2	Sand washing M/C	Set	2
1 4 3	Repair of shell mold M/C	Set	1
1 4 4	Repair of magnetic separator	Set	1
2	Extension of raw material yard, melting capaicty, and improvement of molding line (A-line)	Set	1
3	Reconstruction plan of old foundry	Set	1
4	Improvement of cleaning & fettling shop	Set	1
5	Increase of C-line capacity	Set	1
6	Process convert of self-hardening line B	Set	1

Note: Detail of item 2 through 6 of "2 Imported M/E": See attached tables.

Attached Table 3-1 LIST OF REQUIRED FACILITIES

#: 4-3(2) Build-up of Casting Capacity
- No.3 HI: Foundry -

No	Items	Unit	No.
7	Over-all repair of existing foundry		
7 1	Flaskless molding line (E-line)	Set	1
7 2	Sand plant for E-line	Set	1
7 3	Increase of melting capacity in old foundry	Set	1
7 4	Improvement of core making and machine tool molding	Set	1
7 5	Other machines & equipment	Set	1
8	Improvement cleaning & fettling shop		
8 1	Stacker crane and storage rack	Set	1
8 2	Special designed automatic grinder	Set	1
8 3	Dust hood and propeller fan and suspension crane extension	Set	1
8 4	Improvement of stress relief annealing furnace	Set	1
8 5	Scribing and inspection instrument	Set	1
8 6	Dip coating facility	Set	1
8 7	Other machines & equipment	Set	1
9	Addition of shell M/C		
9 1	Additional shell M/C (VF-C)	Set	1
9 2	Additional mold	Set	1
10	Process convert of self-hardening ling B		
10 1	Process convert of B-line	Set	1
10 2	Metalic flask (addition)	Set	1
10 3	Re-construction for sand plant	Set	1
10 4	Replace & re-layout of core making	Set	1
10 5	Other machines & equipment	Set	1

Detail List of Imported ME

#: 4-3 Increase of Casting Capacity (1)

	Items	Unit	No.
2	Extension of raw material yard, melting capacity, and improvement of molding line (A-line)		
2 1	Extension of raw material receiving and storage shop		
2 1 1	Overhead travelling crane with operation cabin & lifting magnet (loading capqcity:5ton, span:9m, lifting magnet:900mm d.(replace))	Set	1
2 1 2	Concrete bunker (Local)	Set	1
2 1 3	Automatic charge making equipment (steel bunker with vibrating feeder, automatic weighing car, rotary transfer device, control panel)	Set	1
2 1 4	Charging bucket (including 2 sets spare)	Set	4
2 1 5	Electric hoist with motor drive trolley (loading capacity:2ton, lift:6m)	Set	1
2 1 6	Monorail and supporting frame	Set	1
2 1 7	Overhead travelling crane (floor controlled, lifting capacity:3.0m, span:9.0m)	Set	1
2 1 8	Steel apron type spot blasting machine with bucket loader & dustcollector (loading capacity:1.2ton/batch, volume:0.4m3/batch)	Set	1
2 1 9	Gate cutting wedge with hydraulic unit (spread force:25ton)	Set	2
2 110	Abrasive cutt-off machine (cutting wheel:610mm d., drive motor:15kW)	Set	1
2 111	Simplified hydraulic baling press for disposed steel sheet (compressive capacity:17.0 ton, press box:500x300x730 mm, bulk ratio:7:1, motor for hydraulic:3.7kW)	Set	1
2 112	Steel Container	Set	10
2 113	Portable electric cutter (blade:250mm d.)	Set	2
2 114	Portable electric drill (drilling capacity:max. 20mm d.)	Set	2
2 115	Hand tools	Lot	1
2 116	Slewing jib and motor chain block with plane trolley (outreach:3.5m, slewing range:240_, loading capacity:0.5ton)	Set	2
2 117	Gas cutting torch and regulator	Set	2
2 2	Increase of melting capacity		
2 2 1	Low frequency induction melting furnace (furnace body capacity:3	Set	1
2 2 2	Electric power equipment (input power:800kW, frequency:50Hz, main swith panel, regulating transformer, capacitor bank, furnace control panel)	Set	1
2 2 3	Hydraulic tilting device and controller	Set	1
2 2 4	Lining material for initial use	Set	1
2 2 5	Wiring material for furnace	Set	1
2 2 6	Open circuit cooling water unit (water pump, emergency gasoline engine pump, cooling water, piping material)	Set	1
2 2 7	Concrete water pool	Set	1
2 2 8	Working deck (expansion)	Set	1
2 2 9	Platform scale (maximum load:100kg)	Set	1
2 210	Scale spring balance (maximum load:20kg)	Set	1
2 211	Immersion thermometer	Set	1
2 212	Optical pyrometer (digital indication type)	Set	2
2 213	CE meter	Set	1

Detail List of Imported ME

#: 4-3 Increase of Casting Capacity (2)

	Items	Unit	No.
2 3	Building and foundation materials for storgae shop (10x59m)		
2 3 1	Steel structure	Lot	1
2 3 2	Siding and roofing material (slate, block and motor) (Local)	Lot	1
2 3 3	Steel door and window sash	Lot	1
2 3 4	Glass and putty	Lot	1
2 3 5	Gutter and rain proof materials	Lot	1
2 3 6	Roof fan with motro (drive motor:2.2kW)	Set	3
2 4	Improvement of semi-automatic molding line (A-line)		
2 4 1	Booster unit for compressed air (motor for compressor:1.5kW, compressor with motor & controller, accumulator, line filter, after cooler, drain separator)	Set	1
2 4 2	Piping materials	Lot	1
2 4 3	Cope rollver device	Set	1
2 4 4	Mold closing device (reconstruction)	Set	1
2 4 5	Weight loading and unloading device (reconstruction)	Set	1
2 4 6	Punchout device with dust hood (reconstruction)	Set	1
2 4 7	Cope shifting device (reconstruction)	Set	1
2 4 8	Metallic flask (including 3 sets spare, inner size:750x900x250/250mm, material:FCD40)	Set	70
2 4 9	Weight (including 3 sets spare, planning weight:450kg/pcs., material:FC20)	Set	45
2 410	Pattern stool with guide pin (material:FCD40)	Set	8
2 411	Pattern plate (consisting of a pair of cope & drag, thickness:30mm, material:SS)	Set	40
2 412	Squeeze board (material:FC25)	Set	1
3	Re-construction plan of old foundry		
3 1	Flaskless molding line (E-line)		
3 1 1	Automatic flaskless molding machine (hydraulid power unit, control panel, molding method:blow and squeeze, molding capacity:120 molds/h, mold size:500x600mm approx., mold thickness:cope:130~200mm, drag:130~200mm, pattern:match plate)	Set	1
3 1 2	Pneumatic pusher	Set	1
3 1 3	Loading device for weight and jacket (jacket pusher and cleaner,weight scraper)	Set	1
3 1 4	Oil cushion cylider	Set	1
3 1 5	Mold traverser (linked twin mold traverser)	Set	1
3 1 6	Pneumatic mold pusher	Set	2
3 1 7	Pouring and mold cooling line (size and standard:JIS 9kg rail)	Set	1
3 1 8	Oil cushion cylinder	Set	2
3 1 9	Chain conveyor with inverter controlled motor	Set	1
3 110	Pneumatic mold pusher	Set	1
3 111	Oil cushion cylinder	Set	1
3 112	Traverser with inverter controlled motor	Set	1
3 113	Mold releasing device (pallet cleaning rotary brush)	Set	1
3 114	Belt conveyor for secondary cooling (belt width:900mm, horizontal length:18.0m approx.)	Set	1
3 115	Sand discharge hopper and belt feeder (storage capacity:2.0m3, belt width:500mm)	Set	1

Detail List of Imported ME

#: 4-3 Increase of Casting Capacity (3)

	Items	Unit	No.
3 116	Control panel for molding line	Set	1
3 117	Secondary wiring materials	Lot	1
3 118	Pallet car (cast iron bottom board with 4 wheel, including 2 sets of spare)	Set	85
3 119	Mold jacket (material:aluminium casting, including 5 sets of spare)	Set	75
3 120	Weight (material:grey cast iron, including 5 sets of spare)	Set	75
3 121	Match plate and supplements	Set	50
3 122	Working deck for pouring	Set	1
3 123	Working deck for molding & core setting	Set	1
3 124	Electric hoist type suspension crane (floor controlled, loading capacity:1.0ton, span:4.0m, lift:4.5m approx.)	Set	1
3 125	Travelling beam and supporting frame	Lot	1
3 126	Air receiving tank (air volume:1.3m3)	Set	1
3 127	Piping material for molding line	Set	1
3 128	Propeller fan (exhaust air volume:330Nm3/min., drive motor:3.7kW	Set	2
3 129	Wet type dust collector (exhaust air voluem:750Nm3/min., blower motor:55kW)	Set	1
3 130	Spilt sand conveyor (capacity:10ton/h, belt width:400mm)	Set	1
3 131	Spilt sand conveyor (capacity:10ton/h, belt width:400mm)	Set	1
3 132	Bucket elevatory (capacity:10ton/h, bucket width:200mm)	Set	1
3 133	Vibrating conveyor (through width:900mm, through length:5.0m)	Set	1
3 134	Rotary cooling drum (treating capacity:25ton/h, drum:2.4mm d., drum length:9.0m total, rotation number:3 rpm.)	Set	1
3 135	Vibrating conveyor (trough width:750mm, trough length:8.0m)	Set	1
3 136	Drum type shot blasting machine with bucket loader (loading capacity:1.0ton/batch, volume:0.5m3/batch)	Set	1
3 137	Steel container	Set	10
3 2	Sand plant for E-line		
3 2 1	Belt conveyor with heat resistant belt (capacity:30ton/h, belt width:500mm)	Set	1
3 2 2	Belt conveyor with heat resistant belt (capacity:10ton/h, belt width:400mm)	Set	1
3 2 3	Belt conveyor with heat resistant belt (capacity:30ton/h, belt width:500mm)	Set	1
3 2 4	Overband magnet separator (type:electromagnet, belt width:600mm)	Set	1
3 2 5	Supporting frame and dust hood	Set	1
3 2 6	Belt conveyor with heat resistant belt (capacity:30ton/h, belt width:600m)	Set	1
3 2 7	Permanent magnetic pulley (350mm d. approx., width:550mm)	Set	1
3 2 8	Belt conveyor with heat resistant belt (capacity:30ton/h, belt width:500mm)	Set	1
3 2 9	Rotary breaker screen (screen drum:900mm d., length:2.0m, max. capacity:20ton/h)	Set	1
3 210	Supporting frame and reserve hopper	Set	1
3 211	Belt conveyor with heat resistant belt (capacity:30ton/h, belt width:500mm)	Set	1
3 212	Water spray device with thermometer	Set	1
3 213	Rotary drum type sand cooler (maximum capacity:20ton/h, drum:1.7m d. approx., drum length:3.2m d. approx.)	Set	1
3 214	Supporting frame and chute	Set	1
3 215	Dust tube type dust collector with blower and rotary valve (exhaust air volume:150Nm3/min.)	Set	1

Detail List of Imported ME

#: 4-3 Increase of Casting Capacity (4)

	Items	Unit	No.
3 216	Belt conveyor (capacity:30ton/h, belt width:500mm)	Set	1
3 217	Bucket elevator (capacity:40ton/h, bucket width:350mm)	Set	1
3 218	Electric chain block with motor drive trolley (loading capacity:2.0ton)	Set	1
3 219	Monorail and supporting frame	Set	1
3 220	Sand storage hopper (storage capacity, return sand:27m3x1 room, new sand:18m3x1 room)	Set	1
3 221	Belt feeder (capacity:40ton/h, belt width:500mm, horizontal length:1.5m)	Set	2
3 222	Belt conveyor (capacity:40ton/h, belt width:500mm)	Set	1
3 223	Bucket elevatory (capacity:40ton/h, bucket width:350mm)	Set	1
3 224	Storage hopper for binder and additive (storage capacity:2m3x2 rooms)	Set	1
3 225	Screw feeder (dia. of casing:7 inch pipe)	Set	2
3 226	Batch type sand mixer (batch hopper, water measuring tank, drivemotor and gears unit, batch capacity:max. 1.35ton, cycle time:4 min., normal capacity:max. 20.0 ton/h, drive motor:55kW)	Set	1
3 227	Working deck and sand receiving hopper	Set	1
3 228	Belt feeder (capacity:40ton/h, belt width:600mm)	Set	1
3 229	Overhead belt conveyor (capacity:25ton/h, belth width:500mm)	Set	1
3 230	Aerator (treating capacity:25ton/h, belt width:500mm, rotation of plow:600 rpm.)	Set	1
3 231	Control panel for snad plant	Set	1
3 232	Secondary wiring materials	Lot	1
3 233	Secondary piping materials	Lot	1
3 3	Increase of melting capacity in old foundry		
3 3 1	Overheqd travelling crane (floor controlled double rail hoist type, loading capacity:10.0ton, span:11.0m, lift:8.0m)	Set	1
3 3 2	Direct indicating type weighing device (weighing capacity:3.0ton)	Set	1
3 3 3	Charging bucket	Set	4
3 3 4	Motor drive traverser	Set	1
3 3 5	Low frequency induction melting furnace (furnace body capacity: 3ton, furnace body, swing cover (monual operation), lining material for initial use, hand ramming tools)	Set	2
3 3 6	Electric power equipment (power input:800kW, frequency:50Hz, main switch panel, regulating transformer, capacitor tank, furnace control panel)	Set	2
3 3 7	Hydraulic tilting device and controller	Set	2
3 3 8	Wiring and power supply materials	Lot	1
3 3 9	Open cooling water circulation unit (flow rate:28m3/h, net pump head:40m, cooling tower, water pump, emergency gasoline, engine pump, piping material for cooling water)	Set	1
3 310	Concrete water pool (Local)	Set	1
3 311	Working deck for melting work	Set	1
3 312	Pouring geared ladle (capacity:150kg)	Set	3
3 313	Transporting cylindrical geared ladle (capacity:1,000kg)	Set	2
3 314	Platform scale (maximum load:100kg)	Set	1
3 315	Scale spring balance (maximum load:10kg)	Set	1
3 316	Ladle preheating and drying device	Set	1

Detail List of Imported ME

#: 4-3 Increase of Casting Capacity (5)

	Items	Unit	No.
3 317	Immersion thermometer	Set	1
3 318	Optical pyrometer (digital indication type)	Set	1
3 319	CE meter	Set	1
3 4	Improvement of core making and machine tool molding in old foundry		
3 4 1	Portable belt conveyor with climbing fin (belt width:500mm, total length:7.0m)	Set	1
3 4 2	Lump sand crashing & replacemation device	Set	1
3 4 3	Bucket elevator (capacity:10ton/h, bucket width:200mm)	Set	1
3 4 4	Sand storage hopper (storage capacity:30m3x1 room)	Set	1
3 4 5	Belt feeder (capacity:10ton/h, belt width:400mm)	Set	1
3 4 6	Batch type high speed mixer unit (sand reserve hopper, mixer with chemical pump, swing arm portable belt conveyor, mixing capacity:2.5ton/h approx.)	Set	1
3 4 7	Pneumatic ramming tools	Set	2
3 4 8	Heavy duty free roller conveyor	Set	1
3 4 9	Vacuum and replace hardening chamber with vacuum pump and pipingelements (chamber size:800x700x400H mm)	Set	1
3 410	Free roller conveyor with stand	Set	1
3 411	Reinforcement of existing building	Set	1
3 412	Replacement of travelling rail and power feeder	Set	1
4	Improvement of cleaning and fettling shop		
4 1	Stacker crane and storage tank		
4 1 1	Low-lift type stacker crane (semi-automatic control, overall height:8.0m approx., rated load:1.0ton, rack control:manual)	Set	1
4 1 2	Steel storage racke (pallet size:1,000x1,200x900mm, No. of pallet:12x6)	Set	2
4 1 3	Steel box pallet (pallet size:1,000x1,200x900mm, loading capacity:1.0ton)	Set	100
4 1 4	Wooden pallet (pallet size:1,000x1,200mm) (Local)	Set	50
4 1 5	Special designed automatic grinder for fly wheel (size of wheel:510x50mm d. approx., drinding unit with motor, hydraulic chucking unit, wheel wear compensation mechanism, control panel)	Set	1
4 1 6	Bag filter type dust collector (exhaust air volume:40Nm3/min.)	Set	1
4 1 7	High frequency power unit for handy type electric grinder	Set	6
4 1 8	Swing frame type grinding machine with electric hoist and cyclone	Set	1
4 1 9	Stationary grinding machine with cyclone (size of wheel:455x50mmd.)	Set	7
4 110	Individual dust hood and duct for grinding and fettling work	Set	1
4 111	Propeller fan (exhaust air volume:120Nm3/min., drive motor:0.75 kW)	Set	10
4 112	Electric hoist type suspension crane (floor controlled, loading capacity:2.0ton, span:5.0m, lift:6.0m)	Set	1
4 113	Travelling beam and supporting frame (extension)	Set	1
4 114	Stress relief annealing furnace (improvement to be fitted in ductile cast iron, reinforcement of heat resistant wall, increasing of burner capacity, exchange of control parts)	Set	1
4 115	Surface plate (table size:1,800x1,200mm)	Set	1
4 116	Tools for scribing work (Scribing block and scriber, steel compass, outside caliper, inside caliper, screw center jack, v-block with clamp)	Lot	1

Detail List of Imported ME

#: 4-3 Increase of Casting Capacity (6)

	Items	Unit	No.
4 117	Measuring instrument (vernier caliper, vernier height gauge, steel rule, universal bevel protractor, square, level, external micrometer, point micrometer, blade micrometer, depth micrometer, dial caliper gauge, dial gauge, level type dial test indicator, magnetic base, clearance gauge)	Lot	1
4 2	Dip coating plant for rust proof		
4 2 1	hanger conveyor unit (loading capacity:200kg/hanger, hanger pitch:0.8m approx., conveying spped:40 hanger/h, hanger chain conveyor with drive unit, take-up unit, guide beam and supporting frame)	Set	1
4 2 2	Pre-heating chamber with air blowing unit for cleaning	Set	1
4 2 3	Dipping tank and dripping area	Set	1
4 2 4	Drying oven with heating and hot air circulation unit (temperature:200_c approx., time for passing:20min. approx.)	Set	1
4 2 5	Electric chain block with plane trolley (loading capacity:0.5ton, lift:3.0m)	Set	1
4 2 6	Propeller fan for ventilation (exhaust air volume:120Nm3/min., drive motor:0.75kW)	Set	3
4 2 7	Hood, duct and supporting frame	Set	1
5	Increase of C-line capacity		
5 1	Shell molding machine: Dump box 1-station type, dry cycle:50 sec, dump box:200kg, hopper:500kg, pattern plate:980Wx680 max.shell mold: 900Wx520Lx180H	Set	2

Detail List of Imported ME

#: 4-3 Increase of Casting Capacity (7)

	Items	Unit	No.
6	Process convert of self-hardening line B		
6 1	Process convert of B-line		
6 1 1	Sand mixer with binder pump (mixing capacity:10ton/h)	Set	1
6 1 2	Vibrate molding table with motor drive roller conveyor (loading capacity:3ton)	Set	1
6 1 3	Motor drive roller conveyor (total length:2.0m)	Set	1
6 1 4	Vacuum and replace hardening chamber with vacuum pump and pipingelements (chamber size:2,000x1,500x600mm)	Set	1
6 1 5	Motor drive roller conveyor (total length:2.0m)	Set	1
6 1 6	Traverser with free roller conveyor	Set	2
6 1 7	Rollover pattern draw machine -reuse-	Set	1
6 1 8	Motor drive roller conveyor (total length:3.9m)	Set	1
6 1 9	Motor drive roller conveyor (total length:5.0m)	Set	1
6 110	Motor drive roller conveyor (total length:3.6m)	Set	1
6 111	Motor drive roller conveyor (total length:4.3m)	Set	1
6 112	Motor drive roller conveyor (total length:1.7m)	Set	1
6 113	Rollover device for cope flask	Set	1
6 114	Mold closing device	Set	1
6 115	Motor drive traverser with driving roller conveyor (loading capacity:3.0ton, size of bogie:1.6x1.2m)	Set	1
6 116	Pneumatic pusher	Set	1
6 117	heavy duty free roller conveyor (total length:18.0m)	Set	1
6 118	Propeller fan & dust hood for pouring (air volume:330Nm3/min., drive motor:3.7kW)	Set	1
6 119	Propeller fan & dust hood for pouring (air volume:330Nm3/min.) -reuse-	Set	1
6 120	Shakeout machine with chute (loading capacity:4.5ton, size of grating:2.0x1.5m)	Set	1
6 121	Core knock-out machine with chute (loading capacity:4.5ton, size of grating:2.0x1.5m) -reuse-	Set	1
6 122	Spilt sand conveyor and hopper -reuse-	Set	1
6 123	Metallic flask	Set	20
6 2	Re-construction for sand plant of B-line		
6 2 1	Vibrating conveyor (capacity:10ton/h) -reuse-	Set	1
6 2 2	Belt conveyor (capacity:10ton/h) -reuse-	Set	1
6 2 3	Belt conveyor (capacity:10ton/h) -reuse-	Set	1
6 2 4	Overband magnet separator -reuse-	Set	1
6 2 5	Supporting frame and chute -reuse-	Set	1
6 2 6	Hammer cruser (treating capacity:10ton/h) -reuse-	Set	1
6 2 7	Bucket elevator (capacity:10ton/h) -reuse-	Set	1
6 2 8	Vibrating screen (treating capacity:10ton/h) -reuse-	Set	1
6 2 9	Buffering hopper for return sand -reuse-	Set	1
6 210	Vibrating feeder with dust hood (capacity:10ton/h)	Set	1
6 211	Sand reclamation equipment (treating capacity:5ton/h)	Set	1
6 212	Vibrating feeder with dust hood (capacity:10ton/h)	Set	1
6 213	Bucket elevator (capacity:10ton/h, bucket width:200mm)	Set	1
6 214	Overhead belt conveyor (capacity:10ton/h, belt width:400mm, horizontal length:10.0m)	Set	1

Detail List of Imported ME

#: 4-3 Increse of Casting Capacity (8)

	Items	Unit	No.
6 215	Sand storage hopper (return sand:30m3x1 room, new sand:10m3x1 room)	Set	1
6 216	Belt feeder (capacity:10ton/h, belt width:400mm, horizontal length:3.0m)	Set	2
6 217	Belt conveyor (capacity:10ton/h, belt width:400mm, horizontal length:6.0m)	Set	1
6 3	Replacement of self curing process core making shop		
6 3 1	Batch type high speed mixer	Set	2
6 3 2	Vibrating table	Set	2
6 3 3	Heavy duty free roller conveyor	Set	1
6 3 4	Core drawing machine	Set	2
6 3 5	Free balance loader	Set	2
6 3 6	Spray device for coating	Set	1
6 3 7	Free roller conveyor	Set	1
6 3 8	Drying oven after coating	Set	1
6 3 9	Electric hoist type suspension crane (floor controled, loading capacity:1.0ton, span:6.0m)	Set	1
6 310	Travelling beam and supporting frame	Set	1
6 311	Propeller fan & hood for ventilation (air volume:330Nm3/min.)	Set	2
6 4	Replace & re-layout of core making	Set	1
6 5	Other machine & equipment	Set	1

Attached Table 3-2: REQUIRED INVESTMENT (#4-3)

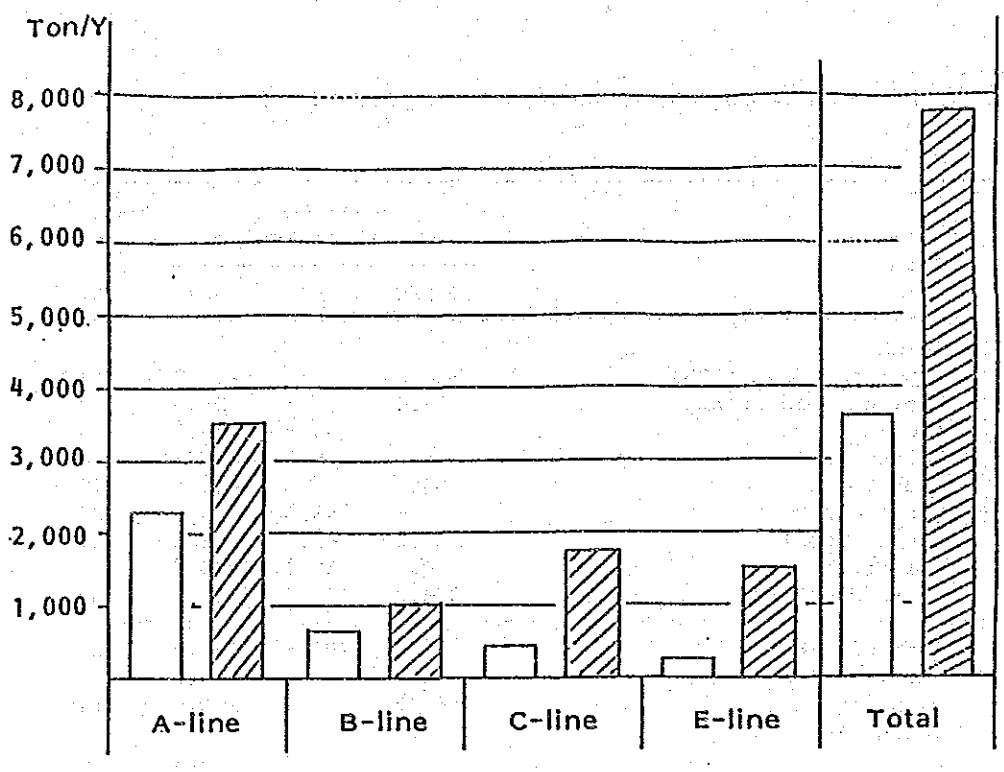
(Unit: million yen)

	Items	Investment		
		Foreign	Local	Total
1	Bldg & Land			
A	Land	-	0.0	0.0
B 1	Building	0.0	0.0	0.0
2	Freight & Insurance	0.0	-	0.0
	Sub-total	0.0	0.0	0.0
3	Import Duty	-	0.0	0.0
4	Unloading	-	0.0	0.0
	Building Total	0.0	0.0	0.0
	Bldg & Land Total	0.0	0.0	0.0
2 1	Imported M/E (FOB)	1400.5	-	1400.5
2	Freight & Insurance	140.1	-	140.1
	Sub-total	1540.6	-	1540.6
3	Import Duty	-	231.1	231.1
4	Unloading	-	30.8	30.8
5	Installation Cost	-	3.4	3.4
	Imported M/E Total	1540.6	265.3	1805.9
3	Local M/E	-	0.0	0.0
4	Other Costs			
A	License Fee	0.0	-	0.0
B	Eng Fee	217.8	-	217.8
C	Software	101.5	-	101.5
D	Interest	0.0	-	0.0
	Other Costs Total	319.3	-	319.3
	Total Investment	1859.9	265.3	2125.2

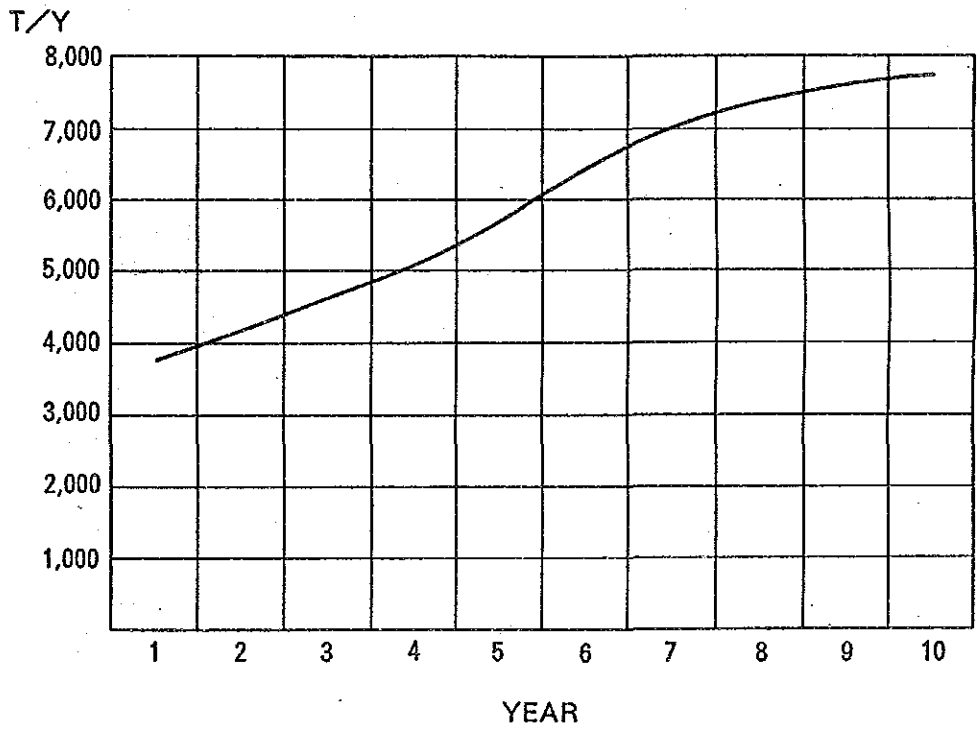
Attached Table 3-3: PRODUCTION COST STATEMENT (#4-3)

	Items	Annual Cost (million Yen) F/C	L/C	Total	Component (%)
1	CP/RM				
A	Imported CP/RM (FOB)	240.2	-	240.2	17
	Freight & Insurance	24.0	-	24.0	2
	Import Duty	-	39.6	39.6	3
	Unloading	-	5.3	5.3	0
	Sub-total	264.2	44.9	309.1	22
B	Local CP/RM	-	343.5	343.5	25
	CP/RM Total	264.2	388.4	652.6	47
2	Utilities	0.0	35.4	35.4	3
	Variable Cost	264.2	423.8	688.0	49
3	Depreciation	92.4	289.5	381.9	27
4	Amortization	0.0	-	0.0	0
5	Maintenance	46.2	144.7	190.9	14
6	Design Fee	0.0	-	0.0	0
7	Labor	-	5.4	5.4	0
8	Ovehead	-	67.0	67.0	5
9	Admin.Cost	-	62.8	62.8	4
	Fixed Cost	138.6	569.4	708.0	51
	Annual Cost	402.8	993.2	1396.0	100
	Unit P.Cost			258518.5	
10	Mark-up			0.0	
11	Excise Tax			0.0	
	Ex-fact.Cost			258518.5	

Attached Figure 1-1 Production increase for each molding line



Attached Figure 1-2 Trend of Casting Parts Production



ATTACHED FIGURE 2-1 Macine Layout of Foundry after Renovation

Classification of Renovation plan

A. Renovation and replacement of worn out H/E
B. H/E to overcome the production bottle neck
D. Foundry facilities extension

A.1 Shot table blast / Replace
A.2 Bucket conveyor / Repair
A.3 Shell molding machine / Repair
A.4 Magnetic separator / Repair
A.5 Washing machine / Replace
B.1 Compressor / Addition

D.1a Concrete bunker
D.1b Automatic charge making equipment
D.1c Raw material sizing shop
D.1d L/F Induction melting furnace
D.1e A-Line / Improvement
D.2a Flaskless molding line (E-line)
D.2b Sand plant for E-line / Replace
D.2c L/F induction melting furnace / Addition
D.2d Electric sub-station
D.2e Water cooling system
D.2f Holding and core making equipment for machine tool
D.3a Process convert of B-line / Improvement
D.3b Sand plant of B-line / Re-construction
D.3c Self curing process core making shop / Replace
D.4a Stacker crane and storage rack
D.4b Dip coating facility
D.4c Scribing and inspection room
D.4d Special designed automatic grinder
D.4e Stationary grinder
D.4f Stress relief annealing furnace / Improvement
D.5a Shell molding machine / Addition