

5-6 Harbor and port-service vessels

Harbor- and port-service vessels, except in some special cases, are handled by SEA COM repair facilities located at Surabaya and Tg Priok, and will not be included in the study.

5-7 Fishing boats

The tonnage calculated in the paragraph 4-1 of this Chapter and shown in Table V-11 is the object to be repaired.

5-8 Summarized conclusion

A summary of the tonnage of the various types of ships as calculated above is shown in Tables V-17 and V-18. Assuming that each ship is required to be docked for maintenance once every year on average, a repair demand commensurate with the obtained tonnage will be estimated.

Table V-17 Breakdown of Tonnage Estimation, 1978-1990

Unit: 1,000GT

Year	Fishing boat 100GT Under	Fishing boat 100GT Above	300GT Local shipping	750GT type R.L.S. 650GT type Dom.tanker	1050GT type R.L.S. Dom. tanker	1500GT type R.L.S. 1800GT type	4550GT type Tramper 3300GT type	5850GT type R.L.S. 6000GT type	12400GT type Dom. tanker	Total
1978	8.9	26.0	134.5	112.8	47.2	75.8	812.0	526.0	175.2	1,412.9
79	4.6	30.2	128.5	116.8	50.8	79.4	330.3	586.0	226.8	1,502.9
80	5.3	35.0	139.0	113.7	52.8	82.5	573.7	563.0	277.5	1,842.0
81	6.1	40.6	151.0	113.8	55.1	87.4	678.1	577.0	828.6	2,032.2
82	7.1	47.1	164.5	118.2	58.2	92.8	678.4	592.0	379.8	2,188.1
83	8.2	54.6	177.8	118.5	68.6	98.8	683.8	608.0	430.1	2,248.4
84	9.6	63.3	189.8	121.1	69.3	107.4	689.1	622.0	482.1	2,858.7
85	11.1	73.4	197.8	130.7	81.7	124.1	694.5	742.0	533.2	2,488.5
86	12.9	85.1	207.8	138.8	98.0	188.7	699.9	657.0	584.4	2,662.6
87	14.9	98.7	222.8	145.4	112.1	156.4	705.2	671.0	635.5	2,762.0
88	17.9	114.5	232.8	151.6	128.1	175.9	710.6	685.0	686.7	2,902.5
89	20.1	132.8	242.8	160.6	144.8	192.3	715.9	699.0	737.8	3,046.0
90	23.3	154.0	252.8	165.5	164.6	215.5	721.3	718.0	789.0	3,199.0

Table V-18 Total-Summary of Tonnage Estimation, 1978-1990

Unit: 1,000GT

Year	Fishing boat 100GT Under	Fishing boat 100GT Above	300GT Local shipping	750GT type R.L.S. 650GT type Dom. tanker	1050GT type R.L.S. Dom. tanker	1500GT type R.L.S. 1800GT type	4550GT type Tramper 3300GT type	5850GT type R.L.S. 6000GT type	12400GT type Dom. tanker
1978	F 3.9	F 26.0	L 134.5	R ₁ 103.5 T ₁ 9.3	R ₁ 47.2	R ₁ 69.4 T ₁ 5.9	L ₁ 267.0 T ₁ 45.0	L ₁ 340.0 T ₁ 185.0	T ₁ 175.2
79	F 4.6	F 30.2	L 128.5	R ₁ 104.0 T ₁ 12.8	R ₁ 50.8	R ₁ 71.3 T ₁ 8.1	L ₁ 280.0 T ₁ 50.3	L ₁ 356.0 T ₁ 180.0	T ₁ 226.3
80	F 5.3	F 35.0	L 139.0	R ₁ 97.4 T ₁ 16.3	R ₁ 52.8	R ₁ 72.1 T ₁ 10.4	L ₁ 518.0 T ₁ 55.7	L ₁ 389.0 T ₁ 174.0	T ₁ 277.5
81	F 6.1	F 40.6	L 151.0	R ₁ 93.5 T ₁ 19.8	R ₁ 55.1	R ₁ 74.8 T ₁ 12.6	L ₁ 612.0 T ₁ 61.1	L ₁ 400.0 T ₁ 168.0	T ₁ 328.6
82	F 7.1	F 47.1	L 164.5	R ₁ 89.9 T ₁ 23.3	R ₁ 58.2	R ₁ 77.9 T ₁ 14.9	L ₁ 612.0 T ₁ 66.4	L ₁ 430.0 T ₁ 162.0	T ₁ 379.8
83	F 8.2	F 54.6	L 177.8	R ₁ 91.7 T ₁ 26.8	R ₁ 63.6	R ₁ 81.7 T ₁ 17.1	L ₁ 612.0 T ₁ 71.8	L ₁ 452.0 T ₁ 156.0	T ₁ 430.1
84	F 9.6	F 63.3	L 189.8	R ₁ 90.8 T ₁ 30.3	R ₁ 69.3	R ₁ 88.0 T ₁ 19.4	L ₁ 612.0 T ₁ 77.1	L ₁ 472.0 T ₁ 150.0	T ₁ 482.1
85	F 11.1	F 73.4	L 197.8	R ₁ 96.9 T ₁ 33.8	R ₁ 81.7	R ₁ 102.5 T ₁ 21.6	L ₁ 612.0 T ₁ 82.5	L ₁ 498.0 T ₁ 144.0	T ₁ 533.2
86	F 12.9	F 85.1	L 207.8	R ₁ 101.5 T ₁ 37.3	R ₁ 98.0	R ₁ 114.8 T ₁ 23.9	L ₁ 612.0 T ₁ 87.9	L ₁ 519.0 T ₁ 138.0	T ₁ 584.4
87	F 14.9	F 98.7	L 222.8	R ₁ 104.6 T ₁ 40.8	R ₁ 112.1	R ₁ 130.3 T ₁ 26.1	L ₁ 612.0 T ₁ 93.2	L ₁ 539.0 T ₁ 132.0	T ₁ 635.5
88	F 17.3	F 114.5	L 232.8	R ₁ 107.3 T ₁ 44.3	R ₁ 128.1	R ₁ 147.5 T ₁ 28.4	L ₁ 612.0 T ₁ 98.6	L ₁ 559.0 T ₁ 126.0	T ₁ 686.7
89	F 20.1	F 132.8	L 242.8	R ₁ 112.8 T ₁ 47.8	R ₁ 144.8	R ₁ 161.7 T ₁ 30.6	L ₁ 612.0 T ₁ 103.9	L ₁ 179.0 T ₁ 120.0	T ₁ 737.8
90	F 23.3	F 54.0	L 252.8	R ₁ 114.2 T ₁ 51.3	R ₁ 164.6	R ₁ 182.6 T ₁ 32.9	L ₁ 612.0 T ₁ 109.3	L ₁ 599.0 T ₁ 114.0	T ₁ 789.0

NOTE:
 F: Fishing boat
 L: Local shipping
 R: 750GT type R.L.S.
 R₁: 1050 #
 R₂: 1500 #
 T₁: 650 Dom. tanker
 T₂: 1800 #
 T₃: 3000 #
 T₄: 6000 #
 T₅: 12400 #
 L₁: 5850 # R.L.S.
 L₂: 4550 # Tramper

Pioneer shipping, industrial carrier and ocean going tanker are omitted because no detailed data are available.

**VI SHIPBUILDING CAPACITY, DEMAND FOR SHIPBUILDING
AND SHIPBUILDING FACILITY REINFORCEMENT PLAN**

1 Outlooking for the Estimation for Shipbuilding Capacity

1-1 New shipbuilding

1-1-1 Existing shipbuilding capacity

The data on existing shipbuilding capacity are summarized as shown in Table VI-01.

Table VI-01 Existing Production-Capability of New Shipbuilding

<u>Type(GT)</u>	<u>0-100</u>	<u>100-500</u>	<u>500-1,000</u>	<u>1,000-5,000</u>	<u>Total</u>
Bldg. cap.	6,355	5,350	22,550	11,100	45,355
No. of berths	65	11	24	4	104
No. of ship-yards	45	11	10	3	
Occupancy ratio (%)	30	50	75	30	
Effective cap. (GT)	1,907	2,675	16,913	3,330	24,825
Production factor	3.0	2.4	1.3	1.3	
Ann. bldg. cap.	5,721	6,420	21,937	4,329	38,457

1-1-2 Occupancy ratio

The occupancy ratio depends on an actual demand-supply relation between the shipping market and shipyard.

When the new building order will be properly distributed to the shipyards corresponding with their capacity in proportion as the shipbuilding demand will increase, occupancy ratio will be higher. Thus, the ratio was forecasted in estimating the future building capacity as follows.

<u>Type(GT)</u>	<u>0-100</u>	<u>100-500</u>	<u>500-1,000</u>	<u>1,000-5,000</u>
Present value	30	50	75	30
Prospected	30	80	80	80

As most of the 0-100 GT type vessels are supposed to be for fishing, no revised value is applied.

1-1-3 Production factor

Since a rise in working efficiency may be expected from advanced level of workers' skill from around 1983, the value of production factor is assumed to change as follows.

<u>Type(GT)</u>	<u>0-100</u>	<u>100-500</u>	<u>500-1,000</u>	<u>1,000-5,000</u>
Up to 1983	3.0	2.4	1.3	1.3
1984 and after	3.0	2.7	2.0	1.5

1-1-4 Prospective new shipbuilding

The prospected occupancy ratio and production factor will bring forth changes in the shipbuilding capacity as shown in Table VI-02.

Table VI-02 Adjusted Production-Capability of New Shipbuilding

<u>Type (GT)</u>	<u>0-100</u>	<u>100-500</u>	<u>500-1,000</u>	<u>1,000-5,000</u>	<u>Total</u>
Bldg. cap.(GT)	5,355	5,350	2,550	11,100	45,355
Occupancy ratio (%)	30	80	80	80	
Bldg. cap. x occupancy ratio (GT)	1,907	4,280	18,040	8,880	33,107
Prod. factor (Up to 1983)	3.0	2.4	1.3	1.3	
(1984 and after)	3.0	2.7	2.0	1.5	
Ann. Bldg. cap. (Up to 1983)	5,721	10,272	23,452	11,544	50,989
(1984 and after)	5,721	11,556	39,080	13,320	66,677

1-2 Repairing

1-2-1 Existing repairing capacity

The data on existing repairing capacity are summarized as shown in Table VI-03.

Table VI-03 Adjusted Production-Capability of Ship Repairing

Type (GT)	0-100	100-500	500-1,000	1,000-5,000	5,000-15,000	Total
Bldg./size cap.(GT)	7,846	9,055	7,940	22,180	35,680	82,701
No. of docks	86	27	9	11	3	136
Occupancy ratio (%)	20	20	40	40	40	
Bldg.cap.x No.of Docks x occupancy ratio (GT)	1,569	1,811	3,176	8,872	14,272	29,700
Repairing factor	33.3	18.8	18.8	18.8	18.8	
Ann.Repairing cap.(GT)	52,248	34,047	59,709	166,794	268,314	581,112

1-2-2 Occupancy ratio

It is desirable that the occupancy ratio will rise as the demand for ship-repairing expands. As the value of this ratio in Table VI-03 seems to be a little too large for the present working efficiency, same value can be used for prospective capacity.

1-2-3 Repairing factor

The repairing factor is estimated as shown in Table VI-03 which was prepared on the basis of actual cases in the past. But, from around 1983, the working efficiency may be expected to rise as the skill of workers will advance. Thus, the factor will be such as follows, in 1984 and after.

Type(GT)	0-100	100-500	500-1,000	1,000-5,000	5,000-15,000
Until 1983					
Docking period	9	16	16	16	16
Repairing factor	33.3	18.8	18.8	18.8	18.8
1984 and after					
Docking period	9	12	12	14	14
Repairing factor	33.3	25.0	25.0	21.4	21.4

$$\text{Repairing factor} = \frac{300 \text{ days: annual working days of dock}}{\text{No. of days for docking}}$$

1-2-4 Prospective repairing capacity

The repairing capacity is figured out from the prospective repairing factor as shown in the Table VI-04.

Table VI-04 Possible Production-Capability of Ship Repairing after 1984

Type (GT)	0-100	100-500	500-1,000	1,000-5,000	5,000-15,000	Total
Repairing capacity	7,846	9,055	7,940	22,180	35,680	82,701
Occupancy ratio	20	20	40	40	40	
Bldg.cap. x occupancy ratio(GT)	1,569	1,811	3,176	8,872	14,272	29,700
Rep.factor	33.3	25.0	25.0	21.4	21.4	
Ann. rep.cap.	52,248	45,275	79,400	189,860	305,420	672,203

2 Prospect Demand for Shipbuilding and Facility Reinforcement

2-1 New shipbuilding

2-1-1 Volume of demand

The demand for new vessels obtained from an analysis made in the Chapter V. It is summarized by types of vessels as follows in Table VI-05.

Some of the figures in the table have been revised based on the Chapter V, the Prospective demand so as to proceed with the program smoothly shortly before the year of its inauguration and the demand for vessels was classified by types as shown in Table VI-05.

2-1-2 Gap between demand and supply

A gap between the prospective demand for new vessels as shown in Table VI-05 and the prospective shipbuilding capacity indicated in Table VI-02 is put forth in the table VI-06 as such between demand and supply

Table VI-05 Demand for New Shipbuilding

- (1) Total gross tonnage
 (2) Number of vessels
 (3) Mean gross tonnage per vessel

Size of ship	0~ 100	100~ 500	500~1,000	1,000~5,000	Total
1978	(1) 650	12,400	7,250	16,050	36,350
	(2) 9	56	10	12	
	(3) 75	221	690	1,310	
1979	740	13,100	5,250	16,050	37,140
	10	60	10	12	
	75	218	690	1,310	
1980	870	13,900	7,250	16,050	38,170
	12	66	10	12	
	75	211	690	1,310	
1981	1,000	14,800	15,250	24,750	50,800
	13	72	14	19	
	75	206	713	1,286	
1982	1,170	18,300	10,250	24,750	54,470
	16	87	14	19	
	75	210	713	1,286	
1983	1,360	19,500	10,250	24,750	55,860
	18	95	14	19	
	75	205	713	1,286	
1984	1,580	20,900	10,250	24,750	57,480
	21	104	14	19	
	75	200	713	1,286	
1985	1,830	22,600	10,250	24,750	59,430
	24	116	14	19	
	75	195	713	1,286	
1986	2,120	24,500	14,750	39,600	80,970
	28	128	20	31	
	75	191	723	1,267	
1987	2,460	26,800	14,750	39,600	83,610
	33	144	20	31	
	75	186	723	1,267	
1988	2,850	29,400	14,750	39,600	86,600
	38	161	20	31	
	75	183	723	1,267	
1989	3,300	32,400	14,750	39,600	90,050
	44	181	20	31	
	75	171	723	1,267	
1990	3,840	35,900	14,750	39,600	94,090
	51	204	20	31	
	75	176	723	1,267	

Table VI-06 Demand/Supply Gap of New Shipbuilding

<u>Size (GT)</u>	<u>0-100</u>	<u>100-500</u>	<u>500-1,000</u>	<u>1,000-5,000</u>
1978	-5,071	2,128	-16,202	4,506
79	-4,981	2,828	-16,202	4,506
80	-4,851	3,628	-16,202	4,506
81	-4,721	4,528	-13,202	13,206
82	-4,551	8,028	-13,202	13,206
83	-4,361	9,228	-13,202	13,206
84	-4,141	9,344	-25,830	11,430
85	-3,891	11,044	-25,830	11,430
86	-3,601	12,944	-21,330	26,280
87	-3,261	15,244	-21,330	26,280
88	-2,871	17,844	-21,330	26,280
89	-2,421	20,844	-21,330	25,280
90	-1,881	24,344	-21,330	26,280

Note: Gap = demand - existing capacity

2-1-3 Balance of surplus/required berths

Table VI-06 shows the quotient obtained from dividing by a mean gross tonnage per vessel, another quotient derived from dividing a gap between demand and supply by the production factor. The former quotient is shown as the balance of surplus and required berths below.

Table YI-07 Surplus/Shortage Gap of Berths

Size (GT)	0-100	100-500	500-1,000	100-1,000	1,000-5,000
1978	+22	(10) ⁴	+18	+14(+8)	3
1979	+22	(12) ⁶	+18	+12(+6)	3
1980	+21	(13) ⁷	+18	+11(+5)	3
1981	+20	(16) ⁹	+14	+5(2)	8
1982	+20	(23) ¹⁶	+14	2(9)	8
1983	+19	(26) ¹⁹	+14	5(12) ³	8
1984	+18	(24) ¹⁷	+18	1(6) ³	6
1985	+17	(28) ²¹	+18	3(10)	6
1986	+16	(32) ²⁵	+15	10(18)	14
1987	+14	(38) ³⁰	+15	15(24)	14
1988	+12	(44) ³⁶	+15	21(30)	14
1989	+10	(53) ⁴⁵	+15	30(39)	14
1990	+8	(59) ⁵¹	+15	36(45)	14

Note: Surplus/required berths = gap bet. demand and supply/
rep. factor/mean GT per
vessel

In a case where surplus berths for the 500-1,000 GT group are diverted to make up the shortage of berths for the 100-500 GT group, the number of berth found short for the latter group is placed under the column, "100-1,000 GT" type of vessel in the above table. The required berths for the group of 1,000-5,000 GT type vessels will amount to 8 during the period of the Third Five Year Plan and then to 14 in 1986 and after.

According to an operational plan of the Rehabilitation Project by P.T. Pelita Bahari, 3 vessels of 3,000 DWT and 4 are to be constructed respectively in 1983 and 1987. If this shipbuilding plan is executed to the end on schedule, the deficiency for the 1,000-5,000 GT vessel group will be made up by 2 berths in 1983 and 3 in 1987.

In the plan to reinforce the berths for the 1,000-5,000 GT group, most of new vessels will be imported for the time being. In 1983 and 1987, however, 80 percent of the demand should be met by domestic supply and 100 percent by 1990. Should these purposes be achieved, how could the reinforcement plan of new facilities for 1,000-5,000 GT group be mapped out? Table VI-08 shows it as the following

Table VI-08 Reinforcement Plan of Facilities for 1,000 - 5,000 GT New Shipbuilding

	1983		1987		1990	
	No. of berths	Ann. amt. of Constr. GT	No. of berths	Ann. amt. of Constr. GT	No. of berths	Ann. amt. of Constr. GT
Planned increase	3	5,015	7	13,303	11	20,905
Pelita Bahari	Gap 2 1	3,343	Gap 3 1	5,701	Gap 3 1	5,701
Total amt. of new construction	(6) 5	8,358	(10) 8	19,004	(14) 12	26,606
Existing cap.	4	11,544	4	13,320	4	13,320
Total	9	19,902	12	32,324	16	39,926
Ann. demand		24,750		39,600		39,600
Rate of domestic constr.		80%		81%		100%

2-1-4 Reinforcement plan of facilities for new shipbuilding

The facility reinforcement plan will be summarized as in the following Table VI-09.

Table VI-09 Summary of the Reinforcement Plan of New Shipbuilding

<u>Size (GT)</u>	<u>0-100</u>	<u>100-500</u>	<u>500-1,000</u>	<u>1,000-5,000</u>
1983	0	3	0	3
1984-1987	Cap.up	(8) 4	0	4
1988-1990	0	21	0	4
1978-1990	-8	36	0	11

2-1-6 Production plan

An output of vessels estimated on the basis of existing and reinforced capacities combined is shown in Table VI-10.

Table VI-10 Shipbuilding Plan for 1978-1990, by Class

	(unit: GT)				
	<u>0-100</u>	<u>100-500</u>	<u>500-1,000</u>	<u>1,000-5,000</u>	<u>Total</u>
1978	650	12,400	7,250	11,544	31,844
79	740	13,100	7,250	11,544	32,634
80	870	13,900	7,250	11,544	33,564
81	1,000	14,800	10,250	13,216	39,266
82	1,170	18,300	10,250	13,216	42,936
83	1,360	18,528	10,250	19,902	50,040
84	1,580	22,600	10,250	9,902	54,332
85	1,830	22,600	10,250	19,902	54,582
86	2,120	24,500	14,750	19,902	61,272
87	2,460	26,800	14,750	32,324	76,334
88	2,850	29,400	14,750	32,324	79,324
89	3,300	32,400	14,750	32,324	82,774
90	3,840	35,900	14,750	39,600	94,090

2-2 Repairing

2-2-1 Demand for repairing

According to an analysis made in Chapter V, prospective demand for ship repairing will fall on the following two cases.

Case-1: (1) Of all vessels over 500 GT flying the Indonesian flags, 10 percent are omitted because they are considered to undergo repairs in Singapore.

(2) One every two ships of 100-500 GT type is deemed to go through the regular inspection only once every two years. Therefore, 75 percent of total tonnage of this type vessels will become to need the repairing service anyhow.

Case-2: (1) The above Case-1 will be applied also to the 500-1,000 GT group. Of all vessels belonging to the over 1,000 GT group, ocean-going liners and trampers are omitted.

(2) Case-1 will also be applied to 100-500 GT vessels. The prospective demand for repairing in Case-1 is indicated in Table VI-11 and Case-2 that derived from calculation of variables alone is shown in Table VI-12

2-2-2 Gap between demand and supply (capacity)

A difference between the existing and prospective ship repairing capacities combined shown in Tables VI-03 and VI-04 (1984 and after) and the demand for repairs shown in Table VI-11 and VI-12 respectively as Case-1 and Case-2 or in short a gap between capacity and demand is indicated in Tables VI-13 (Case-1) and VI-14 (Case-2).

Table VI-11 Estimated Demand for Repairing (Case-1)

(1) Total gross tonnage (unit 1,000ton)

(2) Number of vessels

(3) Mean G.T per vessel

Size of Ship	0-100	100-500	500-1,000	1,000-5,000	5,000-15,000	total
1978	(1) 3.9	120.3	101.5	391.0	631.1	1,247.8
	(2) 52	466	137	150	93	985
	(3) 75	258	742	2,602	6,808	
1979	4.6	119.0	105.1	414.5	686.1	1,329.3
	61	472	143	160	97	1,036
	75	252	735	2,587	7,058	
1980	5.3	130.5	102.0	637.7	710.4	1,585.9
	71	522	140	212	105	1,168
	75	250	734	3,015	6,746	
1981	6.1	143.7	102.0	734.0	815.0	1,800.8
	81	581	140	237	113	1,289
	75	249	731	3,101	7,245	
1982	7.1	158.7	101.9	746.5	874.6	1,888.8
	95	647	140	243	119	1,403
	75	245	726	3,072	7,362	
1983	8.2	174.3	106.7	761.7	934.3	1,985.2
	109	718	147	254	124	1,536
	75	243	727	3,001	7,522	
1984	9.6	189.8	109.0	779.2	993.7	2,081.3
	128	791	151	265	131	1,681
	75	240	721	2,945	7,614	
1985	11.1	203.4	117.6	810.3	1,057.7	2,200.1
	148	861	163	286	137	1,843
	75	236	722	2,831	7,732	
1986	12.9	219.7	124.9	842.9	1,117.3	2,317.7
	172	945	173	311	143	2,033
	75	232	723	2,715	7,808	
1987	14.9	241.1	130.9	876.3	1,175.9	2,439.1
	199	1,051	182	335	149	2,249
	75	229	720	2,617	7,918	
1988	17.3	260.5	136.4	913.1	1,234.5	2,561.8
	231	1,147	190	361	155	2,471
	75	226	718	2,530	7,975	
1989	20.1	201.7	144.5	947.7	1,293.1	2,687.1
	268	1,271	202	386	161	2,738
	75	222	717	2,455	8,027	
1990	23.3	305.1	149.0	991.3	1,352.0	2,820.7
	311	1,403	208	419	167	3,029
	75	218	716	2,369	8,119	

Table VI-12 Estimated Demand for Ship Repairing (Case-2)

Figures in the range of ship (0-1,000GT) are same as case-1.

- (1) Total gross tonnage except OCEAN GOING VESSELS
- (2) Number of vessels
- (3) Mean GT per vessel

Size of Ship	1,000-5,000	5,000-15,000
1978	(1) 167.5	361.2
	(2) 108	45
	(3) 1,551	8,027
1979	180.5	406.3
	116	48
	1,556	8,465
1980	190.5	400.3
	121	51
	1,574	7,849
1981	203.6	496.6
	128	55
	1,591	9,029
1982	217.4	541.8
	135	58
	1,610	9,341
1983	234.3	586.1
	147	61
	1,594	9,608
1984	253.8	632.1
	159	64
	1,596	9,877
1985	288.3	677.2
	183	67
	1,575	10,107
1986	324.6	722.4
	210	70
	1,546	10,320
1987	361.7	767.5
	237	73
	1,526	10,514
1988	402.6	812.7
	266	76
	1,514	10,693
1989	441.0	857.8
	294	80
	1,500	10,723
1990	489.4	903.0
	330	83
	1,483	10,800

Table VI-13 Gap of Capacity/Estimated Demand for Repairing (Case-1)

Figure = Estimated demand - Capacity

unit : 1,000GT

Size (GT)	0- 100	100- 500	500-1000	1000-5000	5000-15000
1978	-48.3	86.3	41.8	224.2	362.8
1979	-47.6	85.0	45.4	247.7	417.8
1980	-46.7	96.5	42.3	470.9	442.1
1981	-46.1	109.7	42.3	567.2	546.7
1982	-45.1	124.7	42.2	579.7	606.3
1983	-44.0	140.3	47.0	594.9	666.0
1984	-42.6	144.5	29.6	589.3	688.3
1985	-41.1	158.1	38.2	620.4	752.3
1986	-39.3	174.4	45.5	653.0	811.9
1987	-37.3	195.8	51.5	686.4	870.5
1988	-34.9	215.2	57.0	723.2	929.1
1989	-32.1	236.4	65.1	757.8	987.7
1990	-28.9	259.8	69.6	801.4	1046.6

Table VI-14 Gap of Capacity/Estimated Demand for Repairing (Case-2)

Figure = Estimated demand - Capacity

unit : 1,000GT

Size (GT)	0- 100	100- 500	500-1000	1000-5000	5000-15000
1978				0.7	92.9
1979				13.7	138.0
1980				23.7	132.0
1981				36.8	228.9
1982				50.6	273.5
1983				67.5	317.8
1984				63.9	326.7
1985				98.4	371.8
1986				134.7	417.0
1987				171.8	462.1
1988				212.7	507.3
1989				251.1	552.4
1990				299.5	597.6

Table VI-15 Required or Surplus of Repairing Docks (Case-1)

Size(GT)	0- 100	100- 500	500-1000	1000-5000	5000-15000
1978	(+17)	18	3	5	3
1979	(+19)	18	3	5	3
1980	(+19)	21	3	8	3
1981	(+18)	24	3	10	4
1982	(+18)	27	3	10	4
1983	(+18)	31	3	11	5
1984	(+17)	24	2	9	4
1985	(+16)	27	2	10	5
1986	(+16)	30	3	11	5
1987	(+15)	34	3	12	5
1988	(+14)	38	3	13	5
1989	(+13)	43	4	14	6
1990	(+12)	48	4	16	6

Note: (+) means surplus of docks.

Table VI-16 Required or Surplus of Repairing Docks (Case-2)

Size(GT)	0- 100	100- 500	500-1000	1000-5000	5000-15000
1978				-	1
1979				-	1
1980				1	1
1981				1	1
1982				2	2
1983				2	2
1984				2	2
1985				3	2
1986				4	2
1987				5	2
1988				7	2
1989				8	2
1990				9	3

2-2-3 Number of required or surplus docks

According to Table VI-13 and VI-14 the number of required or surplus repairing docks is calculated by the following equation:

$$\text{A gap between demand and capacity for repairs} = \text{ship repairing factor} \div \text{mean GT per vessel} \div \text{number of docks}$$

The ship repairing factor is taken from Tables VI-03 and VI-04 and the mean value of GT per vessel from Tables VI-11 and VI-12.

The results of the calculation are shown in Tables VI-15 (Case-1) and VI-16 (Case-2).

2-2-4 Ship repairing facilities reinforcement plan

Based on the number of surplus or required docks derived from Table VI-15, 16 (page 132) and in consideration of the present situation of this country, the number of docks should be increased as follows:

Up to 100 GT: The repairing facility of this capacity used may still be surplus in number even in 1990.

100-500 GT: By 1983, 31 repairing docks are required to be built.

Twelve docks of up to 100 GT capacity should be enlarged to raise their capacity while new 7 set up at the same time. Totally 19 docks, 60 percent of 31 docks should be newly constructed.

500-1,000 GT: If 3 new sets be built up by 1983 and one by 1990, the demand for repairs will be satisfied.

1,000-5,000 GT: In 1983, if 30 percent of ocean going trampers are to be repaired by domestic repairing facility, additional 6 docks will be required. Case-1 is the target to be achieved by 1990.

Those mentioned in the above will be summarized as shown in Table VI-17.

Table VI-17 Number of New Installation of Repairing Docks

<u>Capacity GI</u>	<u>0-100</u>	<u>100-500</u>	<u>500-1,000</u>	<u>1,000-5,000</u>	<u>5,000-15,000</u>
1983 (3rd 5 yr plan)	12 docks' cap. upped to 100-500 level	19, of which, 7 new, with cap. upped	3	6	3
1984-1990		29	1	10	3
1978-1990	-12	48	4	16	6

2-2-5 Capacity of repairing facilities, demand for repairing and tonnage of fleet

Table VI-18 shows changes in capacity of repairing facilities, demand for repairing in Case-1 and Case-2 and tonnage of fleet.

Table IV-18 Ship Repairing Plan for 1978-1990

		(Unit: 1,000 GT)					
Size (GT)	0-100	100-500	500-1,000	1,000-5,000	5,000-15,000	Total	
1978 Exist capacity	52.2	34.0	59.7	166.8	268.3	581.8	
Demand Case-1	3.9	120.3	101.5	391.0	631.1	1,247.8	
Demand Case-2	3.9	120.3	101.5	167.5	361.2	754.4	
Fleets	3.9	160.5	112.8	434.5	701.2	1,412.9	
1983 Planned capacity	8.2	120.0	106.7	491.3	667.9	1,394.1	
Demand Case-1	8.2	174.3	106.7	761.7	934.3	1,985.2	
Demand Case-2	8.2	174.3	106.7	234.3	581.1	1,109.6	
Fleets	8.2	232.4	118.5	846.3	1,038.1	2,243.4	
1990 Projected capacity	23.3	305.1	149.0	991.3	1,352.0	2,820.7	
Demand Case-1	23.3	305.1	149.0	991.3	1,352.0	2,820.7	
Demand Case-2	23.3	305.1	149.0	489.4	903.0	1,869.8	
Fleets	23.3	406.8	165.5	1,101.4	1,502.0	3,199.0	

VII BACKGROUND AND PROCEDURE OF THE SURVEY/STUDY AND THE STUDY TEAMS

1. Background and Procedure of the Study

In response to T/R.DTA-138 formulated by the Government of the Republic of Indonesia dated July, 1976, the Government of Japan decided to cooperate in making the comprehensive study for "the Development Planning of Shipbuilding Industry in the Republic of Indonesia:.

For Indonesia, the study is the first effort to establish the integrated master-plan to develop shipbuilding industry which is still in the generation of cradle, under the authorization given by the Presidential Decree No. 45 issued by President of the Republic of Indonesia (published August 26, 1974) and by the Official Agreement between Directorate General of Sea Communications of the Ministry of Communications and Directorate General of Metal and Engineering of the Ministry of Industry (exchanged May 21, 1975).

For Japan, despite of the facts of many cooperation, assistance or aid programmes have been done for Indonesia, the study is also the first effort to make the complete set of development plan for the one of key-industries in the country.

The effort is, therefore, a quite unique and meaningful event for both of the two countries, Indonesia and Japan.

According to the aforementioned, Japan International Cooperation Agency has conducted the spot-survey works twice, the first one for 35 days from September 23 to November 6 in 1977 as the general research and the second one for 40 days from July 21 to August 29 in 1978 as the depth-research by aspect/dimension, after careful pre-study to clarify the objective and the direction exactly of what Indonesia wishes to pursue.

The first interim report was completed June, 1978 and the second one was composed September in the same year, then the final one is appearing today.

The Study Teams

The study was, as mentioned in Chapter 1 of this Issue proceed directly by the group of experts both of Indonesia and Japan in cooperation with other many personnels and specialists indirectly in the countries. The member of experts directly engaged in the study is as follows. (Alphabetically, except Leader of the Teams, without the honorific titles)

Japan

Teruji Akaiwa (Leader)

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Indonesia



Sonny Harsono
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Anwar
Bahar



Asianto
Marsaid



Budiadi
Adipranoto



Hoelyono A.S.



Puwadi



Sahab
Hutagalung



Sugema



Suharto



Sutito

Heniarto

Syahbandi

APPENDIX

Spot-Survey Data

on

18 Shipyards

O U T L I N E

This appendix is prepared for the depth reference on individual major shipbuilding and ship-repairing yards in which the studying-team has been in the spots to research.

Composition of the referencial materials on each yard is roughly as the followings.

1. General Outlook
2. Questionnair & Answers
3. Physical & Managerial Data Available
4. Location-map & Lay-out of the Yard and so on

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Note: Of these 18 studied shipyards, the following 4 shipyards were studied to the further details by the 2nd survey team in 1978.

- 3. P. T. INTAN SENGKUNYIT
- 6. P. T. PAKIN
- 10. P. T. MENARA
- 14. P. T. IKI MAKASSAR

Accordingly, the report of 3 shipyards except P. T. IKI MAKASSAR, which were transferred from under control of Ministry of Industry to P. T. at the end of 1977, are at the 1st study in 1977.

J. GALANGAN RAJAL PADANG (G.R.P.)

1. General Situation

1-1. Introduction

This shipyard is one of the four shipbuilding yards under the control of the Ministry of Industry.

The co-operation agreement concluded in 1957 between the Indonesian Government and the Polish Government was cancelled in 1965, and a new shipyard was established in 1970. Most of the initial facilities are still being kept in the warehouses in the yard, and only 15% of them are being utilized in the present shipbuilding yard. These facilities stored in the warehouses mostly lack parts, and little of them is ready for immediate use.

They say that the inauguration of the full scale business activities will be retarded by incomplete preparation of the Government which delays P.F. preparation of the organization, facilities, employees, etc.

All the ships built in this yard are all wooden vessels, and the actual results brought so far are one KCM fishing boat built in 1974, one SW inspection boat built in 1975, and one 1500 fish carrier which is still under construction as of 1977. The annual repairing capacity recorded is 4,000 tons including steel and wooden vessels.

This shipyard has no outfitting quay, and all the fitting works must be carried out within the dock. So the turnover efficiency of the dock is low.

1-2. Conditions of Location

Padang is an important port in West Sumatra for both fishery and marine transportation having a large industrial hinterland, and a promising center of education and administration.

The present area is approximately 2,500m². It is by no means large, but leaves room for future expansion. As it is located in Sea-Fort Garuda Bayar, the land rent is relatively high, and this may put pressure upon business management.

1-3. Shop Facilities

The management policy has not established yet, since the full scale business activities say.P. have not started.

The wooden vessel building and repair facilities are up-to-date and quite excellent. The re-building and repairing facilities for steel vessels, which insufficient, should be consolidated upon obtaining the sanction of P.F. Especially the re-building facilities for steel vessels are furnished with almost nothing, and the building berth is now being shared with wooden vessels. The berth has no crane facilities though the port-side leaves enough space for that. Thus many of fundamental problems, including the problem of building process coordination between wooden vessels and steel vessels, remain unsolved.

Of all the weak points of this shipyard, the most fatal is that it has no outfitting quay.

1-4. Organization and Employees

As shown in the organization table, the system of enterprise has been established. For the time being, it waits for the P.F. approval of the authorities. Of the total 59 employees, only 36 are workers and the others are management staffs. It indicates that the percentage of the management staffs is very high.

1-5. Production Management and Production Technique

The carpenter shop has enough space and capacity,

and is well-equipped. The workmanship of the carpenters is quite excellent.

The fixed method of systematic management has not been established yet, though self-inspection on the spot and round-inspection by the manager are being carried out.

The surfaces of cut section are not smooth, though the acetylen gas cutting is used. So they are normally grinder-finished after the chipping treatment. The standard of technique is average. None of the workers has been qualified by the technical examination for welding work, but trainers from Ships Bureau of the Ministry of Industry are occasionally training them.

1-6. Production Efficiency and Term of Work

The average term of work for L.S. steel vessels is 10 days, and for S.S. steel vessels 60 days. This term of work is roughly on the same level as of the other shipbuilding yards. If the outfitting quay is established, the waiting time loss will be effectively diminished and the turnover efficiency of the dock will be drastically improved, for, under the present situation, the term of repair work is equal to the docking period.

1-7. Design

At present, the shipyard has one designer and ten drafters, and all the necessary drawings are being drafted by them. But drafted by them are only these drawings for steel vessel repair and wooden vessel re-building and repair. The design staff will have to be reinforced for the steel vessel re-building work in the future.

1-8. Material Procurement

It takes three months to procure the main engine, but the procurement itself will not constitute a hindrance to the term of work. All the other materials are procurable at Padang, and time required for their procurement is short enough to keep the term of work.

2. Problems

2-1. There are various basic problems yet to be solved as to the management policy, shop facilities, organization and employees, etc. These problems mainly arise from the special circumstances delaying inauguration of the full scale business activities. They wait for the P.F. approval.

2-2. Especially the completion of the building berth, the preparation of the crane facilities, and the construction of the outfitting quay are the most fundamental problems awaiting solution.

5. Tools

- 1) Size of tool store 20 m x 30 m
- 2) Main tools
 - a) Air Hammer
 - b) Electric drill, brush
 - c) Hydraulic Jack
 - d) Hammer, spawer, etc.

6. Productivity

- 1) New Shipbuilding
- a) Pan-hour

	Type, Kind, No. of Typical Ships	hull Weight	Pan-hours (Hull Part)	Total Pan-hour
I	Fishery 3	wooden		6,300 H
II	Inspection ship 1	"		4,200 H
III	Fishery 15	"	(for training school boat)	8,400 H

- b) Hull construction — hours/ton
- c) Hull construction — cost/ton
- d) Construction period
 - i) 3 months (average)
 - ii) —
- e) Construction cost
 - A. Inspection ship (wooden)
 - Material cost 55k
 - Wage & charge 30k
 - others 15k

2) Ship repairing

- a) Total gross tonnage per year: steel & wooden vessels 4,000 ton/year
- b) Total pan-hours per year: 52,500 hour/year
- c) Total sales amount per year: Rp. 50 million/year
- d) Pan-hour/steel ton (in the case of steel replacement): — hour/ton
- e) — cost
- f)

	A.S.	S.S.	
Wooden vessel	Rp. 800,000	2,500,000	Cost/ship
Steel vessel	Rp. 2,500,000	17,000,000	
- g) Repairing period
 - i) wooden vessel 7 days
 - ii) steel vessel 18 days

7. Material procurement

Item	Purchase Price (Rp)	Where Purchased from	Order-to-Delivery time	Stock Amount
Auto Engine	90,000-100,000/Rp	YANMAR ISUZU Isuzu & Assen in Padang	1 month	
	60,000- 80,000/Rp	Cataplor Detroit 111/Rp	3 months	
	60,000- 80,000/Rp	German 130/Rp Assen	1 month	
Generator		Home-made		
Steel Plate	225/Rp	local in Padang	1 month	5-6 T
Profile	275/Rp	"	"	
Welding Rod	Kote 450-500/Rp Phillips 550-700/Rp	"	1 day	
Paint	Acil Coll. 1,500/Rp Acil F. 2,100/Rp	"	"	
Pipe		"	"	
Wood	1-40-70,000/m ³ 11-30-40,000/m ³	"	"	

8. Design

- 1) Number of designers 1 man & 2 drafter
- 2) Drawing list 必要図面は別紙である
- 3) Drawing method
 - Pen
 - Pencil
- 4) Photo copying machine —

9. Construction Techniques

- 1) Gas cutting work Acetylene gas cutting, 必要に応じて grinding 作業は 使用するが、一般に grinding のみ
- 2) Welding work 溶接は必要箇所のみで、工業界の標準を受けている。技能も豊富
- 3) Coating method 本船屋の修理工事であるから塗料は少ない。
- 4) Fitting work —
- 5) Marking work —

10. Points to be noted on shipbuilding & repairing

- 1) Design —
- 2) Material procurement —
- 3) Construction —
- 4) Personnel shortage

B -

Necessary drawings are domestically drafted

9 - 1)

Acetylene gas cutting, occasionally grinding finish is applied but generally chipping finish alone

- 2)

There is no qualified welding worker, but the employees are receiving occasional training arranged by Ministry of Industry. The technical level is average.

9 - 3)

This method is seldom applied to the repair work of small-aluminum which is often the case with this shipyard

10 - 4)

Man requirement is impossible because P.M. is not appointed yet

- 5) Unsatisfactory quality
設備が不足しているため、仕事が悪く、品質が落ちる。
- 6) Schedule Behind
Fitting quayが長いので全ての工事を dock 内で済ませるため、工費が増える。
- 7) Inspection trouble
- 8) Others
- (1) Department of Industry の承認は得られたが、Dep. of Finance の承認は得られなかったため、P.T. にならない。従って企業名義に入らず、其後の費用、人員補充ができない。
- (2) 設備が不足している。 Bending machine; Shearing machine など
- (3) 船泊の作業 Space が狭い。
- (4) 船泊のための人員数が少ない。
- (5) 船泊費の増大が原因であるため、土地賃料が Rp 3,600,000/year と高く、船泊の圧迫要因である。
- (6) 支払い条件
- | | | | |
|------------------|-------------|------|------|
| Raw Shipbuilding | Ship repair | S.S. | A.S. |
| Contract | 30% | 30% | 20% |
| SOB work | 30% | 30% | |
| Contractly | 30% | 30% | 30% |
| Contractly 費 | 10% | 10% | |

Contractly 費の 10% 代金引当金
1年かかるともなる。

- 5) Because of insufficient facilities, the working efficiency is low and the quality is not good
- 6) The term of work is apt to be retarded because every work must be finished within the dock for the lack of outfitting quay
- 6) 1. The consolidation of facilities and new recruitment of employees are impossible because the P.T. approval is not obtained from the department of finance and the full scale of activities as an enterprise is not started yet, though the approval of the Ministry of Industry has been secured
2. Some essential facilities like bending machine, shearing machine, etc., have not prepared yet
3. The working space of the building berth is too narrow
4. Locking sign for repair are not easy
5. The land rent is as high as 3,600,000 Rp./Year as the yard is located in Semarang strike way, this is one of the factors putting pressure upon management
6. Terms of payment : 2 months after delivery (the 10% of the cost to be paid 2 months after delivery is very difficult to collect, and perfect collection often takes more than one year)

12 SHIP REPAIRING RECORDS (B-1-1) (1976)

NO.	NAME	OWNER	KIND	CLASS	D.V.T.	C.T.	Exp	B	0
1	Ko. BIAS JARA	P.T. Kasli Sibolga	Cargo	P.T.	150T		32.0	6.0	2.5
2	Ko. DECAR ASASER	"	"	"	60T		22.0	6.0	2.5
3	Ko. SETIA BANGSA II	P.T. Sejatiara Padang	"	"	150T		30.0	7.0	3.0
4	Ko. INAPPA I	P.T. Kelappa Padang	Top Boat	"	150P		17.0	4.0	2.0
5	Ko. FLORES	Kep. Batang Padang	Cargo	"	250T		35.0	6.0	3.0
6	Ko. NREI SONGO	P.T. SATEI JAKA PADANG	"	"	200T		36.0	7.0	3.0
7	Ko. PERAS SIKERU	Panda Aceh	"	D.R.T.	360T		43.0	7.6	3.0
8	Ko. AB. 635	Savitasi Teluk Besar	Pilot	P.T.	150P		19.0	3.0	1.5
9	Ko. PELAS BASAFAR	P.T. Kasli Sibolga	Cargo	"	60T		24.0	5.0	2.5
10	Ko. BRATASCA PC.A	Panda Soratara Barat	"	D.R.T.	125T		26.0	6.0	2.5
11	Ko. AGARE	P.T. Karang Sibolga	Asset	P.T.	2-225P		24.0	6.0	3.0
12	Ko. FANU PILOT PR.006	Kep. Teluk Besar	Pilot	"	150P		19.0	3.0	1.5

SHIP REPAIRING RECORDS (B-1-2) (1976)

NO.	SALES			COST	REPAIRING PERIOD	PERIOD IN DOCK	PARTICULARS		
	ALL YEAR	MACHINERY WORK	ELECTRICAL WORK				ALL YEAR	MACHINERY WORK	ELECTRICAL WORK
1	3,102,630	-	-	600,000	30	30	1,692	-	-
2	259,616	-	-	120,000	4	4	126	-	-
3	264,320	-	-	120,000	4	4	130	-	-
4	300,000	-	-	150,000	5	5	150	-	-
5	705,000	-	-	350,000	14	14	300	-	-
6	2,343,200	-	-	5,200,000	113	113	2,560	-	-
7	4,320,000	9,637,360	-	3,100,000	25	25	3,454	400	-
8	660,352	-	-	270,000	11	11	300	-	-
9	433,200	-	-	430,000	5	5	150	-	-
10	11,643,166	-	-	8,700,000	24	24	9,800	-	-
11	9,549,152	500,000	-	5,500,000	55	55	5,300	250	-
12	3,137,000	540,000	-	8,300,000	32	32	9,400	300	-

13 YARD FACILITIES
(1) BERTH & DOCK

NO.	NAME & TYPE	CLASSIFICATION		NET. SIZE OF SHIP				D.V.T.	D.V.T.	D USE
		L (M)	B (M)	L (M)	B (M)	D (M)	D (M)			
1	Building Berth	45	9.4					150		B
2	Ship repair	58	8.8					150		A
3	Docking Dock	60	9.0					200		B

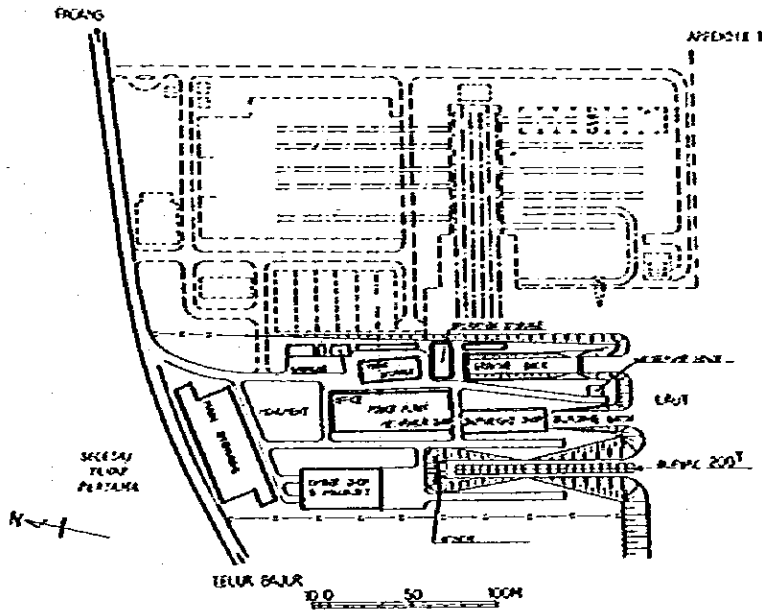
D USE : Building (B), Repairing (R), Building & Repairing (B & R)

(5) Utilities

Items	Capacity
Electric Power	BVRB 275 KVA } x 2 360 HP } 105 HP } 85 KVA } x 1 VARRIB 300 KVA/day
Drinking & Industrial Water Facilities	Hand Pump Well I 1.8 BRL

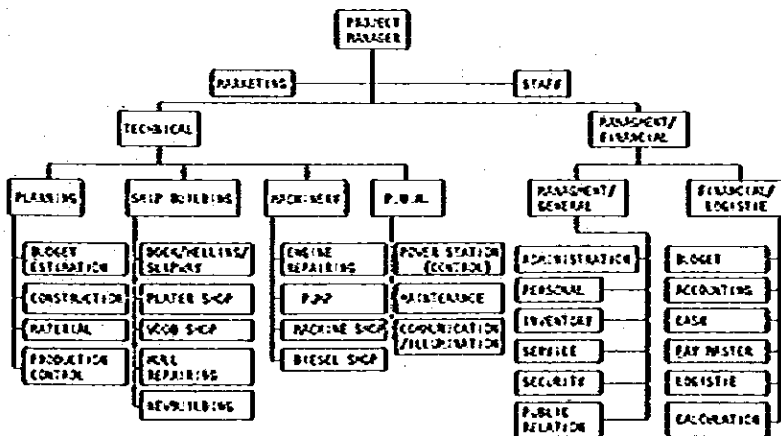
13 - (5) - "Utilities"

1. Private power generation
2. Average power consumption 1,300 KVA/day
3. There is no water supply, though there is a well with a hand-pump



ORGANIZATION GALANGAN NAVAL PRANGS

APPENDIX B



I. P.T. KOSIDINS

1. General Situation

1-1. Introduction

This shipyard started repair work of ships owned by POKSIBSA at Pangkalan Sura in 1961, and became the constructor of PSHAWINA also at Pangkalan Braddan.

It built four trawl fishing ships of P.T.J. Surya SANTI in 1970, and also carried out the project of Pelawan Port Administrator in the same year. In 1971, it established a branch shipyard at Niasi especially for POKSIBSA, and concurrently promoted the construction work for Niasi Port Administrator. In 1975, it obtained a license as the constructor of the irrigation project at Jakarta, and became the sole agent of Highspeed Diesel Engine in North Sumatra in 1977. From 1972 to 1975 it built a number of small ships, and now it has annual business orderings approximately of 1000 D/W including tug boats and barg survey boats.

As mentioned above, this shipyard is engaged in not only shipbuilding and repair work but also overland construction work. This gives it a different character from that of the other shipbuilding yards. There are no berth facilities, and the shops are not well-equipped. It attracted our attention that a concrete boat was under building there.

1-2. Conditions of Location

This shipyard is located at the mouth of the North Malacca Strait about 3km from KOBAN, and the tidal current is said to be 7 knots with 2.5m range of tides. There are no prominent facilities in the yard except a few buildings, and the site is quite sparsely.

1-3. Shop Facilities

At present, this shipyard has only four buildings,

a machine shop, a woodworking shop, a drawing room, and an office. Each shop is equipped with insufficient machines, and most of them are out-of-date. As for the lifting facilities, there are only one 10T crane and one 15T crane, both mobile-crane.

1-4. Organization and Employees

Three staffs are stationed at the representative office at KOBAN, and 41 employees are working at the branch office at Niasi, and 37 employees at P.T. KOSIDINS. As previously mentioned, this shipbuilding yard is also engaged in overland construction work, and has the departments of civil engineering, mechanical engineering, and electrical engineering besides the department of shipbuilding. (This type of organization is not observed in any other shipbuilding yard.)

The working hours per week are 43, and the allowance for overtime work until 21:00 is 15%. The allowance for overtime work after 21:00 in weekdays and that for holiday work are 200%. The working clothes and shoes are not being supplied. To the direct workers, Rp. 150 is supplied for their lunch, and supper in the case of overtime work. To the indirect workers and the staffs, lunch is served. As for the recreation facilities, all the staffs ranking between director and engineer are individually supplied with a car, and the other employees are commuting by bus privately arranged. As for the sickness and injuries due to occupational cause, the medical expenses are covered by the shipbuilding yard and a casualty allowance is also supplied.

1-5. Production Management and Production Technique

At the time of our survey, it was only the repair work of a barge and the rebuilding work of a pilot boat that they were engaged in, and there was no technical problem requiring special comments. They were making wood frame with 6cm ϕ rods for the cement boat, and we were told that cement would be poured into a plywood ship mould constructed there-with. Technically, it seemed quite unique. In the other fields of work than shipbuilding, they were manufacturing heating coils approximately of 5m in diameter.

1-6. Production Efficiency and Term of Work

According to the past records, it takes 50 days to finish rebuilding of a 100 D/W barge after keel laying, and 170 days to build a pilot boat. As for the average term of repair work, it takes 90 days to repair a 1000 D/W barge, and 25 days for a 150HP tug boat, though the past business achievements both in shipbuilding and repair work are insufficient to discuss the problem of production efficiency and term of work.

1-7. Subcontractors

Subcontractors are employed only in the fields of cool outfitting work, and each subcontractor has approximately 10 workers.

1-8. Design

This shipyard employs only one ship designer and ten drawers.

1-9. Material Procurement

All the necessary materials except the main engine are available at Medan, though they had no other material stock than walking rods.

111 QUESTIONNAIRE

2. General

- 1) Layout of shipyard (appendix 1) P.T. POSEINDO
- 2) Location and map (appendix 2) Rt. Serna Parafiah 10 Belawan
- 3) Area: Area of premises 22,500 m²
Area of production "
- 4) Annual production capacity
New shipbuilding 2,000 B/W
Shiprepairing 3,000 B/W
- 5) Water depth: Water front length 160 m
- 6) Tide: Max 12 m
Min 9.5 m } Difference 2.5 m
- 7) Current: 7 knot

- 2. Yard expansion plan: Yes Cyclolift dry dock 1250 T.L.C. (2,000 B/W) EST/ETK/FR/EL/ER/MS/9.
- No

3. Organization and number

1) Tree diagram (appendix 3)

2) Number of employees for each rank

- Director and manager 3 persons
- Section chief and sub section chief 5 persons
- Foreman and group chief 8 persons
- Worker 82 persons

3) Ranking structure of education

- S.P. Elementary school (6 years) } persons
- S.L.T.P. (S.R.P., ST ...) Secondary school (3 years) } 18 persons
- S.L.T.A. (S.R.A., S.T.A.) High school (3 years) } 24 persons
- ASACOL College (3, 4 years) } persons
- UNIVERSITY (4, 5 years) } 6 persons

4) Annual supply of B.A. and workers

	1971	1972	1973	1974	1975	1976
B.A.	30	"	"	"	"	"
Workers	80	"	"	"	"	"

5) Overtime allowance for each hour

Working time: Mon-Fri 08:00-16:00
Sat 08:00-13:00

16:00 18:00 19:30 21:00
150% week holiday

6) Ratio of annual salary up

Not fixed yet
1977 April 20% up

7) Welfare equipment

Cloak, shoes and gloves - no supply

8) Meal supply

- Lunch: Rp.150 for Direct worker
Food for staff and indirect worker
- Dinner: Rp.150 for Direct worker

9) Traffic expense

Prepare bus for all workers
One van one car for director, vice director and engineer

10) Insurance

Supply doctor expense and salary for accident in working time only.

11) Safety for worker

No rate

12) Training of worker

No training center
1977 trained welder 12 persons x 3 months at training center in PELAS

4. Subcontractor

- 1) Kind of skills: Wood working
- Number of workers: 65-10 persons
- Wage: Money will be calculated including material and labour.

Indices for English/Japanese in the questionnaire

(Code No.)

(Contents of Answer)

- 2. - they are planning to build a cyclo-lift dry dock of 1,250 T.L.C.(2,000B/W) in the year of 1976.

- 2) Degree of skill Enough

- 3) Number of company One company

5. Tools

- 1) Size of tool store
- 2) Main tools
a) Air No
b) Electric Boring drilling and grinding
c) Hydraulic
d) Hammer, spanner, etc. Three (3) automatic gas cutting machine

6. Productivity

- 1) New Shipbuilding
a) Man-hour
b) Hull construction hours/Ton
c) Hull construction cost/Ton
d) Construction period
i)
ii)
- 2) Ship repairing
a) Total gross tonnage per year: 67/year
b) Total man-hours per year: hour/year
c) Total sales amount per year: /year
d) Man-hour/steel ton (in the case of steel replacement): 53 hour/Ton
e) Sales/ST
f) i) 1000V large Rp.40,000,000 sales/ship steel plate 3.5T
ii) 1500V Rp. 6,000,000 replace 4 T
g) Repairing period i) Five (5) months
ii) One (1) month

7. Material procurement

Item	Purchase Price	Where Purchased from	Order-to-Delivery Time	Stock Amount
Main Engine	150 HP Rp. 8 million	Catapilla	3-6 month	-
Generator	20 KW Rp. 1.5 million	Tavar from Pelan	Immediately	-
Steel Plate	Rp. 185/kg	Local	"	No stock
Profile	Rp. 245/kg	"	"	No stock
Welding Rod	Rp. 750/kg	"	"	10 T
Paint	A/E Rp. 1500/kg A/F Rp. 3500/kg	"	"	No stock
Pipe	60 3/4 V. Seas Rp. 3000/m	"	"	"
Wood	MERANTI BATS Rp. 75000/m ³	"	"	"

8. Design

- 1) Number of designers One(1) for hull design and two(2) drawers
- 2) Drawing list NO
- 3) Drawing method * Pas
* Pencil
- 4) Photo copying machine NO

9. Construction Techniques

- 1) Gas cutting work Three(3) Automatic gas cutting machine
- 2) Welding work No automatic welding machine
- 3) Gouging method No use tools (by hand)
- 4) Fairing work By hammer
- 5) Marking work By hand chalk

10. Points to be noted on shipbuilding & repairing

- 1) Design Buy eighteen(18) sheets minimum from SINGAPORE AS requires only ten(10) sheets
- 2) Material procurement Equate angle is popular but unequal angle is unpopular then difficult to get
- 3) Construction NO problem
- 4) Manpower shortage NO problem
- 5) Unsatisfactory quality Information caused by welding
- 6) Schedule behind NO problem
- 7) Inspection trouble NO inspection tools for example X ray etc.
- 8) Others In SINGAPORE shipyards can give credit for ship repairing but in INDONESIA cannot, it causes low competitiveness.

11. NEW SHIPBUILDING RECORDS (A-1-1) (1976) : No Records

NET ALL STEEL WEIGHT	PRICE (Rp)	COST (Rp)	CONSTRUCTION SCHEDULE				CONSTRUCTION PERIODS					DESIGN PERIOD	
			Contract	Launching	Keel Laying	Delivery	Keel Erect.	Keel Plating	Keel Buffing	Keel Painting	Keel Polishing		
1 40.5 Ton	2550000	2050000	18-9-1976	19-10-1976	20-9-1976	10-11-1976	1500	1500	150	-	-	140	300
2 15.8 Ton	3163000	2500000	20-8-1976	30-8-1976	30-8-1976	18-2-1977	1500	700	170	210	150	210	2500

12. SHIP REPAIRING RECORDS (B-1-1) (1976)

	ASSE	OWNER	KIND	CLASS	D.W.T.	G.T.	App	B	D
1	FBA-1201	BAGERA ADIGUNA	FLAT TOP BARGE	BKI	1000	-	54.000	13.000	2.400
2	TR-SEA BILAS	P.T. SOEFINDO	TUG BARGE	BKI	150-P	-	16.000	4.500	1.600

SHIP REPAIRING RECORDS (B-1-2) (1976)

	SALES (Rp)			COST (Rp)	REPAIRING PERIOD	PERIOD IN DOCK	RECORDS		
	RUSS WORK	MACHINERY WORK	ELECTRICAL WORK				RUSS WORK	MACHINERY WORK	ELECTRICAL WORK
1	4000000	-	-	3500000	50 Days	50 Days	3500	-	-
2	4000000	1500000	500000	5000000	25 Days	25 Days	400	150	50

13. TUG FACILITIES

(1) BERTH & DOCK

NO.	NAME & TYPE	DIMENSION		MAX. SIZE OF SHIP				G.T.	D.W.T.	USE
		L (M)	B (M)	App (M)	B (M)	D (M)	d (M)			
1	Building Berth	30						300		B
2	"	100						1000		B

* USE : Building (B), Repairing (R), Building & Repairing (B & R)

(2) CRANES

	A TYPE	MAX. LIFT LOAD	MAX. ELEVATION	MAX. BEACH	NUMBER	LOCATION
1	R.C.	10 Ton			1	
2	"	15 Ton			1	
3	D.W.C.	5 Ton			1	
4	Fork lift	5 Ton			1	
5	Jack	5 Ton			5	
6	"	10 Ton			2	
7	"	50 Ton			2	

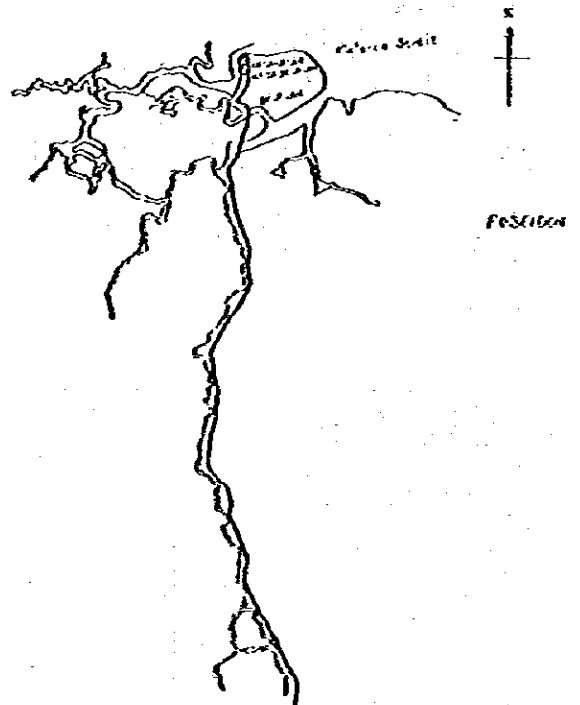
Type: Portal crane (P.C.), Over Crane (O.C.), Tower Crane (T.C.)

Level Lifting crane (L.L.C.) "M" Stage Crane (M.C.) Mobile Crane (M.C.)

(4) Utilities

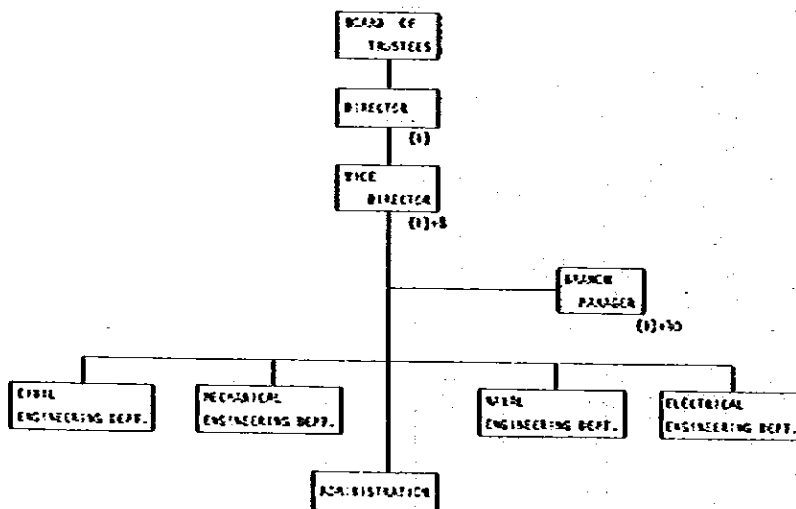
Items	Capacity
Electric Power	P.L.W. 150 K.V.A. Generator 150 K.V.A.
Drinking & Industrial Water Facilities	Deep well of Rany 20 Ton/day
Compressed Air Facilities	
Acetylene & Oxygen Facilities	L.P.G. 3-12 Bottles/day Oxygen 30-720 Bottles/day
Water Pollution Control Facilities	No
Others	No

APPENDIX 2



ORGANIZATION P.V. POSEIDON BASE

APPENDIX 3



1. General Situation

1-1. Introduction

The shipyard faces the Musi River, and has an enormous area. The slipways and the building berths line up alongside the river, facing to Kemarau Island across the river. Part of Kemarau Island has been shaved off for launching ships, and the river span has been widened to 165m. An oil tanker of 900 DWT and 59.2m in length, the largest in this country, was launched here in October, 1977, without any difficulty.

The insufficient river width naturally limits the size of vessels built at this shipyard. They are planning to take a drastic measure of facilities improvement for the future expansion of the building capacity especially for large-sized vessels.

Also in this respect, it is essential to have a well-equipped outfitting yard.

At the time of our survey, five ships were under the outfitting work, and six other ships were under building on the respective berths. For these eleven vessels, the employees were forced to work for about four hours beyond the usual work time.

Little flow of the steel materials was observed in the marking yard, the cutting yard, and the sub-assembly yard, though a number of vessels were building and outfitting work was seen on the building berths and on the surface of the river as stated above.

The water depth of the river is as deep as 6m even at low tide, and considered to be sufficient for large-sized vessels expected to be built here in the near future.

1-2. Topography

The shipyard is situated in Palembang near the mouth of Musi River and face the river. There is a sand bank on the opposite side of the river. The water depth of the river is 6 m. The range of tide is as high as 3 m. Sometimes tidal current speed reaches as high as 5 knot. At present many building berths for new ships and repairing are located, facing the river, just like the teeth of a comb. The river is 175 m across (200 m at full tide). The water depth and the river width are more than sufficient for launching ship of 3,000 DWT.

1-3. Building Facilities

1) Building Berths: The building berths for new ships are just the ground with a slight inclination toward the river. Official capacity is 1 - 300 DWT, 1 - 1,000 DWT. Actually 19 berths are provided. 3 berths out of them are used for building ships of 1,000 DWT. Unused berths are overgrown with weeds. The berths are of longitudinal type. The launching system is tallow launching. Big size rectangular timbers are put in a row all over the berths. The top surface is bedded with tallow for launching. In order to brake a ship stop wire ropes are fastened to anchors set to the bottom of the river.

On the other hand, 1 - 250 GT and 1 - 1,000 GT berths are provided for repair ships. Both berths are of longitudinal slipway type. Launching is carried out by pulling up the ship by means of the motor driven winches. Only defect is that the side will happen to break. The improvement plan is safe for the above trouble.

2) Quay: The quay was constructed along the river. Accordingly, they have the trouble with the mooring quay. At present, 3 ships are moored arranging in a row by utilizing the space in front of each berth. Only mooring device is the bollard. It is fairly difficult to promote repair work under the circumstances as above. At present there are as many as three ships under rigging.

Again, at present stage, the most advisable improvement is to provide the mooring quay.

3) Crane: 1 - 30 T LCC is installed between 3,000 DWT berth for new ships and 1,000 DWT slipway. Besides, 1 - 100 T and 8 - 15 T mobile cranes are provided. SENGAMATI is one of the shipyards which are provided with many cranes in particular in Indonesia.

4) Workshop: It seems that two workshop layouts are planned but the final decision has not made yet. At present, some of workshops are already completed, and the machines installed, floor space and foundation are all useful for building large vessels to their satisfaction. Workshops already completed are machine shop, fittings shop and plater shop. The finishing and assembly shop are partially completed.

5) Work Spots: Steel materials are stored at various places, there is no fixed spot for marking or gas cutting. It seems that workers have to do work in finishing work to the utmost. Under the present circumstances, they can do nothing else but working under the present condition as above, because no surface table for marking and gas cutting. Most of assembly work is carried out outdoors, and the ground level of work spots is not even.

6) Welding Machines: Most of the welding machines are of transformer type. All the machines are new and the number of machine is quite sufficient. Also the capacity of 60KA is sufficient for building large vessels in future.

The only inconvenience is that no automatic or semi-automatic welding machine is provided.

It is necessary to study on the above machine which is of great use for building vessels of 1,000 DWT.

7) Gas cutting Machines: Semi-automatic gas cutting machine is used only for cutting long size steel materials. It can be applied in further wide scope.

8) Electricity: At present, an independent power generator of 3,150 KVA is provided. The capacity is sufficient enough for building 2 - 3,000 DWT ship at the same time.

9) Water: A water tank of 100m³ is provided for generator cooling water and toilet water. Water is taken in from Musi River.

10) Oxygen and Acetylene Gas: Shipyard buys oxygen gas and L.P.G. gas in bottles from outside. Acetylene gas is generated using carbide and supplied in bottles.

1-4. Organization and Labour Force

1) Organization: General manager is under President, and 3 departments, Yard, Finance and General are provided over by Managers. Yard department is classified into 6 divisions. Planning division including Design, plays the role of staff among 6 divisions. Meanwhile, Finance and General comprise 4 and 3 divisions respectively.

Total number of registered employee is 543. All the managers and chiefs are graduates of universities or academies. 74% of the remainings are high school graduates, 30% finished secondary or elementary school. The educational level is fairly high in Indonesia where the illiteracy rate is said to be 42%.

Design belongs to Planning Division. All the drawings are made in the organization. The number of designers is as follows: Hull: 4, Rigging: 2, Fittings: 2, Electric Equipment: 1, Miscellaneous: 35. Total number is 44.

Design room is near to Yard and Plater shop. As ship owners and surveyors from Classification Society are stationed in the same building, the layout is very convenient for quick mutual contact.

2) Working Hours: 8:00 to 16:00 from Monday to Thursday, 8:00 to 16:30 on Friday (lunchtime - 11:45 ~ 12:15), 8:00 to 12:00 on Saturday. Weekly working hours is 39. The secondary survey commenced just on August 7, when Mohammedans began to fast. A few workers were working in the shipyard. So many absentees may be due to fast or shortage of work. The number of workers allotted to each work is 3 ~ 4 workers.

3) Workers: 3 to 4 workers in one group comprising advanced age, middle age and young workers. It is said that young workers are under training at INT. Some of workers get a complete set of necessary tools and accessories or pitching hammer, hand shield, gloves and apron, and some others bathe in the water before the closing time. Observing regulations leaves something to be desired.

1-4. Production Control and Technical Level

1) Shipbuilding Instructions: In case of the tanker of 900 DWT which was under construction on berths, block assembly is carried out in upside-down condition or with fore peak and after peak deck of ship under.

It seems that the building instructions are not specially made for this work. However, it is clear that discussions have been made by the persons concerned.

2) Work Schedule: After discussion on building instructions general work schedule is made. Based on the discussion, all the schedules including material acquisition schedule are listed up in the synthetic production schedule at AOSUM Data Center by means of the electric computers. In accordance with the above synthetic production schedule, all the work are carried forward.

Furthermore, as to the actual achievement records, progressing conditions are recorded on the growth chart. Management leaves nothing to be desired.

Upon completion of facilities and software in addition to the perfect hardware, rapid progress in productivity improvement can be expected.

3) Standards and Criteria: Neither standards nor criterias were made. Work is carried out depending on BCI rules and their own experiences.

4) Quality Control: Inspection is made by means of X-ray, supersonic fault detector and eye check detector. X-ray inspection is made at AOSUM and other two inspections are made in the organization. Quality control is applied to quality itself and accuracy of dimensions. It is preferable to try to improve accuracy of dimensions in future.

1-5. Technical Level

Few skilled workers have the welding license of BCI or B as shown below.

Overhead: 12, Vertical: 9, Flat: 16

It is said that the reason for the above is due to the fact that long time and considerable expenses are necessary to obtain welding license. The training term is 3 months (2 hours per day). Necessary expenses for obtaining license amount to 100,000 Rp per capita. Instead, they put many hours in technical training of welding and gas cutting. They say that technical education was given to all the workers including all the welders for 3 months (2 hours per day). Accordingly, they should make an effort to have their welders, as many as possible, obtain the license. Meanwhile, welding performance noticed in actual work is not good. The poor results may be due to the defect of welding edges and temporary welding.

1-6. Production Efficiency and Term of Work

The average term of work from keel laying to delivery and from keel laying to launching recorded per type of vessel is as follows:

4000V Landing Craft	Keel Laying ~ Delivery	32 Months
6500V Tug Boat	Keel Laying ~ Delivery	26 Months
9000V Coaster	Keel Laying ~ Launching	15 Months
9000V Oil Tanker	Keel Laying ~ Launching	12 Months
Hull Construction	50 ~ 60kg/man-day	
Ship Repairing	45kg/man-day	

Judging from the Growth Chart which contain the past results and the conditions of corrosion observed on the ships on the berths, the building schedule seems to be consciously delayed.

There is a considerable difference between the results of the primary survey and those of secondary survey. The difference between 160 P/T and 243 P/T may be due to the above reasons.

However, considering such a primitive method as applying shell plates one by one without any efficient equipment on the berths 160 P/T may be fairly good coefficient at present. In order to rate further improvement, it is necessary to adopt the block building system in which work is divided, and to improve the equipment.

1-7. Material Procurement

More than 90% of the whole material is imported, and it takes more than three months after placing an order to procure the material. This often causes a delay in working schedule.

2. Problems

2-1. The site is quite spacious, and the shop facilities are effectively laid out for shipbuilding process. The machines and tools are new. So high quality service and efficient productivity will be easily obtainable by suitable production management.

2-2. The present building facilities into the site limit to construct vessels at this yard, but a drastic improvement plan is mapped out for the future expansion of the shipbuilding facilities.

2-3. For the time being, long overtime work is quite common. It is most desirable to rearrange the production schedule in consideration of the production efficiency and the quality too.

III QUESTIONNAIRE

Indices for English/Japanese
in the questionnaire

(Code No.)

(Contents of Answer)

1. General

- 1) Layout of shipyard (appendix 1) P.T. Intan Sengkongit
- 2) Location and map (appendix 2) M. Intan Sel Selincak, Palembang
- 3) Area: Area of premises _____
Area of production 350,000m²
- 4) Annual production capacity
New shipbuilding B/W (G/T)
Shiprepairing 92,500 (G/T)
- 5) Water depth: 6m at low tide
- 6) Tide: 3m
- 7) Current: max. 5 Knots

2. Yard expansion plan: Yes 20,000DWT/year の設備拡張を計画してゐる。
Expansion plan up to 20,000DWT/Year

3. Organization and number

- 1) Tree diagram (appendix 3)
- 2) Number of employees for each rank 840 persons in all
Director and manager 5 persons
Section chief and s.A section chief 13 persons
Foreman and group chief 38 persons
Worker 454 persons

- 3) Training structure of education

S.D.	Elementary school (6 years)	} _____ persons
S.L.T.P. (S.A.P., ST ...)	Secondary school (3 years)	
S.L.T.A. (S.A.A., S.V.A.)	High school (3 years)	360 persons
AKADAM	College (3, 4 years)	4 persons
UNIVERSITY	(4, 5 years)	8 persons

4) Annual supply of S.A. and workers

	1971	1972	1973	1974	1975	1976
S.A.	_____	_____	_____	_____	_____	_____
Workers	_____	_____	_____	_____	_____	_____

5) Overtime allowance for each hour _____

7) Welfare equipment

住宅 住宅有線内C skilled worker の200名に居住可能あり。

3 - 7)

Housing: the yard has accommodation for about 200 skilled workers in the precincts

8) Meal supply

Lunch: _____
Dinners: _____

9) Traffic expense _____

10) Insurance _____

11) Safety for worker _____

12) Training of worker

In 1976 150 persons by shipyard
In 1977 50 persons to Labour Department Center (Weld & Cutting)

4. Subcontractor

- 1) Kind of skill: Weld
Number of workers: 25
Veges: _____
- 2) Degree of skill _____
- 3) Number of company 4

5. Tools

- 1) Size of tool store _____
- 2) Main tools
 - a) Air Hammer, drill, grinder
 - b) Electric
 - c) Hydraulic Jack
 - d) Hammer, spanner, etc. plenty

6. Productivity

1) New Shipbuilding

a) Man-hour

	Type, Kind, B/D of Typical Ships	Null Weight	Man-hours (Null Part)	Total Man-hour
I				
II				
III				

- b) Hull construction 24374/T
- c) Hull construction 15% higher than Singapore
 - Coastal Cargo 1,500\$/TW
 - Tanker 1,750\$/TW

d) Construction period

- i) 4000t Landing Craft 1. 29 Months
- 2. 35 "
- ii) 6500t Tug 1. 26 "

2) Ship repairing

- a) Total gross tonnage per year: 35,352 Gt/year
- b) Total man-hours per year: _____ hour/year
- c) Total sales amount per year: _____ /year
- d) Man-hour/steel ton (in the case of steel replacement): 45 kg/man/day
- e) _____ Cost/Gt 2 \$/kg (plate weight)
- f) _____ Cost/ship
- g) Repairing period
 - i) Annual survey average 20 days
 - ii) Special survey

7. Material procurement

Item	Purchase Price	Where Purchased from	Order-to-Delivery time	Stock Amount
Main Engine	-	Japan	over 3 months	-
Generator	-	Japan	"	-
Steel Plate	-	-	-	-
Profile	-	-	-	-
Welding Rod	-	local	1 day	-
Paint	-	owner supply	-	-
Pipe	-	local	1 day	-
Wood	-	local	"	-

8. Design

- 1) Number of designers 10 persons
- 2) Drawing list 必要図面は自前で準備。(手入) 船体A面~E) Tankerの図面は船主提供
- 3) Drawing method
 - Pen
 - Pencil
- 4) Photo copying machine 1 unit

8 - 2)

Necessary drawings are occasionally drafted, but the drawings of tanks are supplied from the respective shipowners.

9. Construction Technics

- 1) Gas cutting work semi automatic gas cutting 3 units
- 2) Welding work 技能次第 普通
- 3) Gouging method
 - electrode & apparatus 作業中は検査員が監視している。
 - automatic 1 unit
- 4) Fitting work
 - Block 建造方式及び joint up した板を現場合をしながら組立てる方法のほかに別の方法を述べている。
- 5) Marking work
 - 図紙のよる板の作業で、作業精度は良悪である。板の合張、手作業による板を現場合をで cut している。

9 - 2)

The technical level is average

- 3)

During the gouging work, an inspector is leaving working area for autonomous inspection.

- 4)

For the time being, 2 methods are employed. The one is the block construction method and the other is the spot assembly method by jointed-up plates.

- 5)

The working condition in the roofed wide shop is comfortable. The jointed-up plates are cut at the spot.

10. Points to be noted on shipbuilding & repairing

- 1) Design _____
- 2) Material procurement _____
- 3) Construction _____
- 4) Manpower shortage _____
- 5) Unsatisfactory quality _____
- 6) Schedule behind
 - 輸入品の手配に遅延が要する。
- 7) Inspection trouble _____
- 8) Others _____

10 - 6)

It takes long time to procure the import materials.

11 NEW SHIPBUILDING RECORDS (A-1-1) (1976)

LINE	NAME	OWNER	KIND	CLASS	D.W.	G.T.	Lpp	B	D	ENGINE	CONSTRUCTION SCHEDULE			
											Contract	Launch- ing	Keel Laying	Deliv- ery
1		E.P.	Landing Craft, L.	B.K.I.	400	227	36.58	9.75	1.58	US		12-4-75	10-7-76	26-11-76
2		P.T.C.	Oil Container 603	"	45	27.15	0.6	5.4	2	-		15-2-75	10-1-75	9-6-76
3		"	"	"	45	27.15	0.6	5.4	2	-		17-2-75	9-1-75	9-6-76
4		"	"	"	45	27.15	0.6	5.4	2	-		17-2-75	11-1-75	9-6-76
5		"	"	"	45	27.15	0.6	5.4	2	-		25-2-75	12-1-75	24-7-76
6		"	"	"	45	27.15	0.6	5.4	2	-		16-4-75	11-2-75	9-6-76
7		"	"	"	45	27.15	0.6	5.4	2	-		16-4-75	10-2-75	9-6-76
8		"	"	"	45	27.15	0.6	5.4	2	-		16-4-75	12-2-75	9-6-76
9		"	"	"	45	27.15	0.6	5.4	2	-		16-4-75	13-2-75	21-7-76
10		"	"	"	45	27.15	0.6	5.4	2	-		16-4-75	11-2-75	21-7-76
11		"	"	"	45	27.15	0.6	5.4	2	-		17-4-75	15-2-75	9-6-76
12		"	"	"	45	27.15	0.6	5.4	2	-		17-4-75	29-2-75	24-7-76
13		"	"	"	45	27.15	0.6	5.4	2	-		17-4-75	25-2-75	9-6-76
14		"	"	"	45	27.15	0.6	5.4	2	-		16-4-75	10-3-75	9-6-76
15		"	"	"	45	27.15	0.6	5.4	2	-		29-4-75	28-3-75	9-6-76

NEW SHIPBUILDING RECORDS

LINE	NAME	OWNER	KIND	CLASS	D.W.	G.T.	Lpp	B	D	ENGINE	CONSTRUCTION SCHEDULE			
											Contract	Launch- ing	Keel Laying	Deliv- ery
16		P.T.C.	Oil Container 603	B.K.I.	45	27.15	0.6	5.4	2	-		10-5-75	7-4-75	21-7-76
17		"	"	"	45	27.15	0.6	5.4	2	-		10-5-75	9-4-75	9-6-76
18		"	"	"	45	27.15	0.6	5.4	2	-		29-5-75	9-4-75	21-7-76
19		"	"	"	45	27.15	0.6	5.4	2	-		29-5-75	9-4-75	9-6-76
20		"	"	"	45	27.15	0.6	5.4	2	-		29-5-75	9-4-75	9-6-76
21		"	"	"	45	27.15	0.6	5.4	2	-		14-5-75	9-4-75	21-7-76
22		"	"	"	45	27.15	0.6	5.4	2	-		14-5-75	12-4-75	9-6-76
23		"	"	"	45	27.15	0.6	5.4	2	-		14-5-75	11-4-75	21-7-76
24		"	"	"	45	27.15	0.6	5.4	2	-		20-5-75	7-5-75	21-7-76
25		"	"	"	45	27.15	0.6	5.4	2	-		23-5-75	5-5-75	9-6-76
26		"	"	"	45	27.15	0.6	5.4	2	-		24-5-75	28-4-75	9-6-76
27		"	"	"	45	27.15	0.6	5.4	2	-		17-6-75	26-4-75	9-6-76
28		"	"	"	45	27.15	0.6	5.4	2	-		17-6-75	5-5-75	9-6-76
29		"	"	"	45	27.15	0.6	5.4	2	-		1-6-75	6-5-75	21-7-76
30		"	"	"	45	27.15	0.6	5.4	2	-		1-6-75	5-5-75	21-7-76

NEW SHIPBUILDING RECORDS (A-3-1) (1976)

LINE	NAME	OWNER	KIND	CLASS	D.W.	G.T.	Lpp	B	D	ENGINE	CONSTRUCTION SCHEDULE			
											Contract	Launch- ing	Keel Laying	Deliv- ery
31		P.T.C.	Oil Container 603	B.K.I.	45	27.15	0.6	5.4	2	-		1-6-75	30-4-75	9-6-76
32		"	"	"	45	27.15	0.6	5.4	2	-		1-6-75	7-5-75	21-7-76
33		"	"	"	45	27.15	0.6	5.4	2	-		21-6-75	28-5-75	21-7-76
34		"	"	"	45	27.15	0.6	5.4	2	-		21-6-75	23-5-75	21-7-76
35		"	"	"	45	27.15	0.6	5.4	2	-		21-6-75	22-5-75	21-7-76
36		"	"	"	45	27.15	0.6	5.4	2	-		10-6-75	19-5-75	21-7-76
37		"	"	"	45	27.15	0.6	5.4	2	-		17-6-75	21-5-75	21-7-76
38		"	"	"	45	27.15	0.6	5.4	2	-		17-6-75	21-5-75	21-7-76
39		"	"	"	45	27.15	0.6	5.4	2	-		25-6-75	22-5-75	21-7-76
40		"	"	"	45	27.15	0.6	5.4	2	-		28-6-75	20-5-75	9-6-76
41		"	"	"	45	27.15	0.6	5.4	2	-		17-6-75	2-6-75	9-6-76
42		"	"	"	45	27.15	0.6	5.4	2	-		17-6-75	1-6-75	9-6-76
43		"	"	"	45	27.15	0.6	5.4	2	-		27-6-75	31-5-75	21-7-76
44		"	"	"	45	27.15	0.6	5.4	2	-		28-6-75	7-6-75	9-6-76
45		"	"	"	45	27.15	0.6	5.4	2	-		5-7-75	10-6-75	9-6-76

NEW SHIPBUILDING RECORDS (A-4-1) (1976)

LINE	NAME	OWNER	KIND	CLASS	D.W.	G.T.	Lpp	B	D	ENGINE	CONSTRUCTION SCHEDULE			
											Contract	Launch- ing	Keel Laying	Deliv- ery
46		P.T.C.	Oil Container 603	B.K.I.	45	27.15	0.6	5.4	2	-		5-7-75	11-6-75	21-7-76
47		"	"	"	45	27.15	0.6	5.4	2	-		6-7-75	15-6-75	21-7-76

SHIP REPAIRING RECORDS (B-1-1) (1976)

	NAME	OWNER	KIND	CLASS	D.W.T.	G.T.	App	B	B	REPAIRING PERIOD	PERIOD IN DOCK
1	MT. Starlet XII	P.S.W.	Oil Tanker	B.R.I. (Emergency Repair)	650	256.95	-	-	-	7	-
2	AD.P.M.B. VIII	P.T.L.	Roaming Boat	Special (Emergency Repair)	-	5.10	0.55	2.75	-	3	-
3	AD.P.M.B. IV	P.S.W.	Roaming Boat	Special (Emergency Repair)	-	5.10	-	-	-	8	-
4	TB. Bawal	P.S.W.	Tug Boat	Special (Annual Docking)	0.33	6.66	15.3	4.5	-	18	18
5	TK.S.P.B. II	P.T. STARBUCK	Barge	B.R.I. (Annual Docking)	400	159.87	30.5	0.35	-	26	26
6	TB. Tripang	P.T.L.	Tug Boat	B.R.I. (Emergency Repair)	36.12	24.37	27.22	5.5	-	26	-
7	TK.P.B. XII	P.T.L.	Barge	B.R.I. (Annual Docking)	300	225	24.8	9.45	-	8	8
8	TB. Sember	P.T. PELINDO RATA	Tug Boat	B.R.I. (Emergency Repair)	-	150.82	-	-	-	18	-
9	AD.M.B. II	P.S.W.	Roaming Boat	Special (Emergency Repair)	6.38	5.10	0.55	2.75	-	51	4
10	CB.P.B. XII	P.T.L.	Barge	B.R.I. (Emergency Repair)	300	225	24.8	9.5	-	24	11
11	TK.S.P.B. III	P.T. STARBUCK	Barge	B.R.I. (Annual Docking)	400	65.96	-	-	-	07	12
12	MT. Starlet XI	P.S.W.	Oil Tanker	B.R.I. (Emergency Repair)	650	256.95	-	-	-	3	-
13	CB.P.B. IV	P.T.L.	Barge	B.R.I. (Emergency Repair)	300	184.62	24.8	9.45	-	2	-
14	MT. Starlet XIII	P.S.W.	Oil Tanker	B.R.I. (Emergency Repair)	650	256.95	-	-	-	3	-
15	AD.M.B. VIII	P.S.W.	Roaming Boat	Special (Emergency Repair)	-	5.1	0.55	2.75	-	2	-

SHIP REPAIRING RECORDS (B-2-1) (1976)

	NAME	OWNER	KIND	CLASS	D.W.T.	G.T.	App	B	B	REPAIRING PERIOD	PERIOD IN DOCK
16	CB.P.B. VII	P.T.L.	Barge	B.R.I. (Emergency Repair)	300	182.68	24.8	9.45	-	25	-
17	CB.P.B. IV	P.T.L.	Barge	B.R.I. (Emergency Repair)	300	182.62	24.8	9.45	-	2	-
18	MT. Starlet II	P.S.W.	Oil Tanker	B.R.I. (Running Repair)	650	256.95	-	-	-	5	-
19	MT. Starlet III	P.S.W.	Oil Tanker	B.R.I. (Emergency Repair)	700	339.88	57.25	9	-	65	-
20	TB. Saban	P.S.W.	Tug Boat	B.R.I. (Annual Docking)	9.45	7.57	-	-	-	52	43
21	TK.S.P.B. I	P.T. STARBUCK	Barge	B.R.I. (Annual Docking)	400	159.87	30.5	0.35	-	28	20
22	TK.S.P.B. IV	P.T. STARBUCK	Barge	B.R.I. (Annual Docking)	400	159.80	30.5	0.35	-	31	28
23	MT. Starlet VIII	P.S.W.	Oil Tanker	B.R.I. (Emergency Repair)	650	256.95	-	-	-	6	-
24	MT. Elpita	P.S.W.	Oil Tanker	B.R.I. (Emergency Repair)	650	256.95	-	-	-	11	-
25	CB.P.B. IV	P.T.L.	Barge	B.R.I. (Annual Docking)	300	184.62	24.8	9.45	-	22	12
26	MT. Starlet XI	P.S.W.	Oil Tanker	Special (Annual Docking)	650	256.95	56	0.6	-	-	-
27	CB.P.B. XII	P.T.L.	Barge	B.R.I. (Annual Survey)	300	184.91	27	9	-	22	11
28	MT. Peratra II	P.S.W.	Oil Tanker	B.R.I. (Running Repair)	2562.6	1558.16	24.5	11.6	-	3	-
29	TB. Bawal	P.S.W.	Tug Boat	Special (Running Repair)	-	6.66	15.24	4.3	-	7	-
30	TB. Galit	P.T.L.	Tug Boat	B.R.I. (Annual Survey)	540	500	-	-	-	18	12

SHIP REPAIRING RECORDS (B-3-1) 1976

	NAME	OWNER	KIND	CLASS	D.W.T.	G.T.	App	B	B	REPAIRING PERIOD	PERIOD IN DOCK
31	AD. Bawal Syl E. 280	P.T. BTR RICE ESTATE PLD	Speed Boat	Special (Running Repair)	-	-	-	-	-	1	-
32	MT. Starlet XI	P.S.W.	Oil Tanker	B.R.I. (Running Repair)	650	256.95	-	-	-	33	-
33	CB.P.B. IV	P.T.L.	Barge	B.R.I. (Running Repair)	300	225	24.8	9.45	-	4	-
34	CB.P.B. VII	P.T.L.	Barge	B.R.I. (Running Repair)	300	182.68	24.8	9.45	-	5	-
35	MT. Peratra II	P.S.W.	Oil Tanker	B.R.I. (Running Repair)	2800	1329.64	-	-	-	5	-
36	TB. Peratra VI	P.T.L.	Tug Boat	B.R.I. (Running Repair)	38.27	24.39	15.24	4.3	-	3	-
37	TB. Bawal	P.S.W.	Tug Boat	Special (Running Repair)	-	6.66	15.3	4.5	-	4	-
38	MT. Starlet IX	P.S.W.	Oil Tanker	B.R.I. (Running Repair)	650	342.06	-	-	-	6	-
39	CB.P.B. XII	P.T.L.	Barge	B.R.I. (Running Repair)	400	186.91	24.8	9.45	-	2	-
40	TB. Apollo B	P.T. PELINDO RATA	Tug Boat	B.R.I. (Annual Docking)	180.52	150.82	-	-	-	35	12
41	TK.S.P.B. I	P.T. STARBUCK	Barge	B.R.I. (Running Repair)	400	159.87	30.5	0.35	-	16	-
42	MT. Peratra VIII	P.S.W.	Oil Tanker	B.R.I. (Running Repair)	2800	1329.64	-	-	-	2	-
43	MT. Peratra III	P.S.W.	Oil Tanker	B.R.I. (Running Repair)	10065	5000	-	-	-	4	-
44	CB.A.R. PERAKA	PERAKA	Barge	B.R.I. (Running Repair)	400	180.41	-	-	-	4	-
45	MT. Starlet IV	P.S.W.	Oil Tanker	B.R.I. (Running Repair)	650	270.53	-	-	-	2	-

SHIP REPAIRING RECORDS (8-3-1) 1976

NO	NAME	OWNER	KIND	CLASS	D.V.T.	G.T.	App	B	D	REPAIRING PERIOD	PERIOD IN DOCK
46	MT. Slamet XI	P.S.W.	Oil Tanker	B.C.T. (Running Repair)	650	278.93				46	1
47	AB.P.S.C. VIII	P.T.R.	Rooring Boat	Spaander (Running Repair)	-	5.10	8.55	2.75		47	2
48	MT. Slamet III	P.S.W.	Oil Tanker	B.C.T. (Annual Survey)	700	348.37	57.25	9		48	32
49	TK. Perastong I	P.T.R.	Barge	B.C.T. (Running Repair)	1500					49	6
50	TK. Perastong Turda I	P.T.R.	Tug Boat	B.C.T. (Running Repair)	-	340.72				50	6
51	AB.P.S.C. VIII	P.T.R.	Rooring Boat	Spaander (Running Repair)	6.38	5.10	8.55	2.75		51	1
52	MT. Ribang	P.S.W.	Oil Tanker	B.C.T. (Running Repair)	14283.55	5278.19	132	22		52	4
53	CB.P.B. IV	P.T.R.	Barge	B.C.T. (Annual Survey)	3000					53	24
54	SB. Deul Sri	P.T. PERASTONG RICE ASI	Speed Boat	Spaander (Running Repair)	-	-				54	60
55	MT. Slamet XIX	P.S.W.	Oil Tanker	B.C.V. (Running Repair)	650	257				55	104
56	MT. Slamet XIX	P.S.W.	Oil Tanker	B.C.V. (Running Repair)	650	257				56	40
57	MT. Slamet XXII	P.S.W.	Oil Tanker	B.C.T. (Running Repair)	650	257				57	25
58	MT. Slamet XIX	P.S.W.	Oil Tanker	B.C.T. (Running Repair)	650	257				58	28
59	MT. Slamet IX	P.S.W.	Oil Tanker	B.C.T. (Running Repair)	650	342.5				59	32
60	MT. Perastong IX	P.S.W.	Oil Tanker	B.C.T. (Running Repair)	2224.55	791.77	71.5	11.7		60	23

SHIP REPAIRING RECORDS (8-5-1) 1976

NO	NAME	OWNER	KIND	CLASS	D.V.T.	G.T.	App	B	D	REPAIRING PERIOD	PERIOD IN DOCK
61	TK. Trigana	P.T.R.	Top Boat	B.C.T. (Annual Survey)	30.93	24.79	22.22	5.5		61	33
62	CB.P.B. VIII	P.T.R.	Barge	B.C.T. (Special Survey)	600	182.68	24.8	9.65		62	23
63	MT. Perastong IX	P.S.W.	Oil Tanker	B.C.T. (Running Repair)	2224.5	791.77	71.5	11.7		63	4
64	MT. Slamet XXII	P.S.W.	Oil Tanker	B.C.T. (Running Repair)	650	257.06				64	5
65	MT. Slamet III	P.S.W.	Oil Tanker	B.C.T. (Running Repair)	700	348.37	57.25			65	4
66	MT. Perastong IX	P.S.W.	Oil Tanker	B.C.T. (Running Repair)	2224.5	791.77	71.5	11.7		66	6
67	MT. Indonesia		Oil Tanker	B.C.T. (Running Repair)	15000	6500				67	4
68	AB.P.S.C. VIII	P.T.R.	Rooring Boat	Spaander (Running Repair)	-	5.1	8.55	2.75		68	3
69	TK. Perastong Turda I	P.T.R.	Top Boat	B.C.T. (Running Repair)	-	340.72				69	2
70	TK. Samar	PERASTONG RICE ASI	Top Boat	B.C.T. (Annual Docking)	63.73	59.58	18.43	5.05		70	25
71	TK. Sugi	PERASTONG RICE ASI	Top Boat	B.C.T. (Annual Docking)	267.25	213.8	29.66	7.52		71	60
72	MT. Slamet VI	P.S.W.	Oil Tanker	B.C.T. (Running Repair)	650	278.93				72	30
73	MT. Slamet XX	P.S.W.	Oil Tanker	B.C.T. (Running Repair)	650	231.83	8.6			73	5
74	AB.P.S.C. VIII	P.S.W.	Rooring Boat	Spaander (Annual Survey)	6.38	5.1				74	22
75	MT. Perastong IX	P.S.W.	Oil Tanker	B.C.T. (Running Repair)	2502.60	1558.16	71.5	11.6		75	3

SHIP REPAIRING RECORDS (8-6-1) 1976

NO	NAME	OWNER	KIND	CLASS	D.V.T.	G.T.	App	B	D	REPAIRING PERIOD	PERIOD IN DOCK
76	MT. Slamet XX	P.S.W.	Oil Tanker	B.C.T. (Running Repair)	650	278.93				76	19
77	SB.P.S.W. I	P.S.W.	Speed Boat	B.C.T. (Running Repair)	-	-				77	6
78	MT. Perastong I	P.S.W.	Oil Tanker	B.C.T. (Running Repair)	2500	1064.67				78	3
79	MT. Slamet III	P.S.W.	Oil Tanker	B.C.T. (Running Repair)	700	348.37				79	3
80	MT. Indonesia		Oil Tanker	B.C.T. (Running Repair)	1500	6500				80	3
81	SB.P.S.W. I	P.S.W.	Speed Boat	B.C.T. (Running Repair)	-	-				81	11
82	MT. Slamet III	P.S.W.	Oil Tanker	B.C.V. (Running Repair)	700	348.37	57.25	9		82	3
83	SB. Deul Sri	TK. Perastong RICE ASI	Speed Boat	B.C.T. (Running Repair)	-	-				83	2
84	MT. Jib Raya	P.S.W.	Oil Tanker	B.C.T. (Running Repair)	13000	3547.83	134.5	13.5		84	5
85	MT. Perastong III	P.S.W.	Oil Tanker	B.C.T. (Running Repair)	8503	4500	132.26	12.14		85	5
86	MT. Slamet I	P.S.W.	Oil Tanker	B.C.T. (Running Repair)	650	283.69				86	6
87	MT. Sargatta	P.S.W.	Oil Tanker	B.C.T. (Running Repair)	13000	3506.60	145.827	13.33		87	16
88	TK. Deul III	Sumber Samudra Raji	Barge	B.C.V. (Annual Docking)	450	216.83				88	12
89	SB. Deul Sri	TK. Perastong RICE ASI	Speed Boat	Spaander (Running Repair)	-	-				89	4
90	MT. Ranteo	P.S.W.	Oil Tanker	B.C.T. (Running Repair)	5032.64	3579.35				90	3

SHIP REPAIRING RECORDS (B-3-1) 1976

NAME	OWNER	KIND	CLASS	D.V.T.	G.T.	Lpp	B	D	REPAIRING PERIOD	PERIOD IN DOCK
91) 90. Roofing Boat 1A	P.S.W.	Roofing Boat	SynStar (Running Repair)	-	5.1				91	3
92) 97. Parola W	P.S.W.	Oil Tanker	B.C.I. (Running Repair)	2500	1500				92	3
93) 18. Kujer	P.S.W.	Tug Boat	B.C.I. (Running Repair)	-	6.65				93	23
94) 90. Starat III	P.S.W.	Oil Tanker	B.C.I. (Running Repair)	650	208.7				94	34
95) 92. Setalat	P.S.W.	Roofing Boat	SynStar (Running Repair)	-	8.07	10	3.05		95	3
96) 90. Roofing Boat 1B	P.S.W.	Roofing Boat	SynStar (Running Repair)	-	5.10	8.55	2.25		96	1
97) 90. Roofing Boat 1C	P.S.W.	Roofing Boat	SynStar (Running Repair)	-	5.10	8.55	2.25		97	1
98) 90. Starat I	P.S.W.	Oil Tanker	B.C.I. (Running Repair)	650	243.63				98	4
99) 90. Starat III	P.S.W.	Oil Tanker	B.C.I. (Running Repair)	650	208.70				99	5
100) 18. Kujer	P.S.W.	Tug Boat	B.C.I. (Running Repair)	-	6.65				100	2
101) 97. Parola IV	P.S.W.	Oil Tanker	B.C.I. (Running Repair)	2502.6	1538.16	24.5	11.6		101	9
102) 90. Aida	P.T. FELDMAN	Cargo	B.C.I. (Running Repair)	540	500				102	8
103) 18. Timah VII	P.T. SUPER TESSAN	Tug Boat	B.C.I. (Running Repair)	-	50	21.58	5.8		103	6
104) 90. Parola II	P.S.W.	Oil Tanker	B.C.I. (Running Repair)	2224.90	211.77	21.5	11.7		104	7
105) 90. Starat III	P.S.W.	Oil Tanker	B.C.I. (Running Repair)	700	343.37	52.25	9		105	3

SHIP REPAIRING RECORDS (B-3-1) 1976

NAME	OWNER	KIND	CLASS	D.V.T.	G.T.	Lpp	B	D	REPAIRING PERIOD	PERIOD IN DOCK
106) 90. Polatlon	P.T. POSSESOR RELEASE	Landing Craft	B.C.I. (Running Repair)	450	230				106	3
107) 90. P.B. 1B	P.T.K.	Barge	B.C.I. (Running Repair)	450	243.93				107	2
108) 90. Raju 22	PERAGARA (MIL II)	Speed Boat	SynStar (Running Repair)	-	-				108	4
109) 90. Aida	P.T. FELDMAN	Cargo	B.C.I. (Running Repair)	540	500				109	4
110) 97. Setal Bayan	P.S.W.	Oil Tanker	B.C.I. (Running Repair)	1300	931.03				110	6
111) 90. R.H.B. 111	P.S.W.	Roofing Boat	B.C.I. (Running Repair)	-	5.1				111	5
112) 90. P.S.C. VIII	P.S.W.	Roofing Boat	SynStar (Running Repair)	-	5.1	8.55	2.25		112	2
113) 18. Petir	PERAGARA (MIL II)	Barge	B.C.I. (Special Boating)	200	150	31.2	9.81		113	62
114) 90. Rusa	P.S.W.	Oil Tanker	B.C.I. (Running Repair)	5115.27	3832	106.95	15.2		114	1
115) 18. Sepat	P.S.W.	Tug Boat	B.C.I. (Running Repair)	-	6.65				115	3
116) 18. Petir (Karya)	P.T. PERAGARA RELEASE JCG	Barge	B.C.I. (Special Boating)	400	371.28	36.52	12.22		116	35
117) 90. Starat III	P.T. DEBARI PERAGARA RELEASE	Oil Tanker	B.C.I. (Special Boating)	600	313.66				117	14
118) 90. Starat III	P.S.W.	Oil Tanker	B.C.I. (Running Repair)	650	273.93				118	6
119) 90. Starat I	P.S.W.	Oil Tanker	B.C.I. (Running Repair)	650	243.63				119	6
120) 18. Spual	P.S.W.	Tug Boat	B.C.I. (Running Repair)	-	6.65	15.3	8.5		120	12

SHIP REPAIRING RECORDS (B-3-1) 1976

NAME	OWNER	KIND	CLASS	D.V.T.	G.T.	Lpp	B	D
121) 90. Baga (Karya)	P.T. ARSINGHE KEMCALA	Cargo	B.C.I. (Special Boating)	204.18	357.9	36	9	
122) 90. P.H. 411	P.S.W.	Roofing Boat	B.C.I. (Running Repair)	-	5.1			

13 YARD FACILITIES

(1) BERTH & DOCK

NO.	NAME & TYPE	DIMENSION		MAX. SIZE OF SHIP				G.T.	D.V.T.	USE
		L (M)	B (M)	Lpp (M)	B (M)	D (M)	d (M)			
1	Building berth	80	12					1,000	0	
2	"	110	18					3,000	0	
3	Slipway repair	100	24					250	1	
4	"	160	20					1,000	1	

* USE = Building (B), Repairing (R), Building & Repairing (B & R)

(2) CRANES

	# TYPE	MAX. LIFT LOAD	MAX. ELEVATION	MAX. REACH	NUMBER	LOCATION
1	MC	100 Ton		20M	1	
2	MC	5-15 Ton			1	
3	TC	30 Ton			1	
4	Fork lift	5 Ton			1	
5	OHC	5 Ton			1	MASHPG
6	OHC	10 Ton		15M	1	BENDING
7	OHC	20 Ton			2	ASSEMBLY
8						
9	MC	10 Ton			4	BUILDING BERTH
10	FB CRANE	30/15 Ton		20/10M	1	BUILDING BERTH
11	MC	10 Ton			3	MACHINE SHOP
12						

Type: Portal crane (P.C.), Over Crane (O.C.), Tower Crane (T.C.)

Level Luffing crane (L.L.C.), "U" Shape Crane (U.C.), Mobile Crane (M.C.)

(3) LAGO & SHOP

Stage & Shop	Area (m ²)		
	Total area	Shop area	Slab area
Shipbuilding			
Steel stock yard			
Fabrication shop	1,800m ²		
Subassembly shop & yard	900m ²		
Assembly shop & yard	5,900m ²		
Grand assembly yard			
Block stock yard			
Berth & Dock			
Pipe shop			
Pipe stock yard			
Machinery shop	1,200m ² x 1 576m ² x 1		
Carpenter shop	90m ²		
Plater shop	1,200m ² x 1		
Electrical shop			
Painting shop	1,400m ²		
Outfitting shop			
Rigging shop			
Iron & Casting shop			
Warehouse	1,200m ²		
Acid loft	1400m ² x 1		
Drawing room	132m ² x 1		
Storage	400m ² x 2 96m ² x 3		
Repairing			
Berth & Dock			
Hull shop			
Machinery shop			
Outdoors working area			
Stockyard			
Warehouse			
Overhaul			

MACHINERY & EQUIPMENT

	TYPE CAPACITY	LOCATION	NUMBER
8	Grinding Machine 12"	"	1
9	Working Table 8.66 m ²	"	3
10	Overhead Crane 10 Ton	"	2
11	Overhead Crane 5 Ton	"	6
12	Welding Generator 300 Ampere 1963	Welding Workshop	5
13	Welding Generator 300 Ampere 1971	"	8
14	Welding Transformer 500 Ampere 1975	"	177
15	Welding Transformer 300 Ampere 1975	"	29
16	Welding Transformer 400 Ampere 1975	"	80
17	Welding Transformer 250 Ampere 1974	"	16
18	Acetylene Generator 2.5 kg. ca ² 1965	"	60
19	Automatic Cutting Torch	"	10
20	Cutting Torch	"	60
21	Over head Crane 10 Ton	"	2
22	Pipe bending Machine 1974	Pipe Workshop	2
23	Over head Crane 3 Ton	"	1
24	Lathe 4 m 1974	Machinery Workshop	3
25	Lathe 2 m 1974	"	3
26	Lathe 3 m 1974	Machinery Workshop	9
27	Lathe 6 m 1973	"	1
28	Lathe 0.75 m 1977	"	1
29	Turret Lathe 5 m 1974	"	2
30	Turret Lathe 8 m 1974	"	2
31	Radial Drilling Machine 1974	"	2
32	Horizontal Drilling Machine 1.5 m x 8 m 1973	"	1
33	Table Planer 0.9 x 1.5 m 1975	"	2
34	Overhead Crane 5 Ton	"	1
35	Drawing floor 70 m ² x 20 m ²	Acid Loft	1
36	Drawing Board (table) 0.9 m x 9.5 m	Drawing/Designing Room	1
37	Drawing Board (table) 0.8 m x 1.2 m	"	3
38	Drawing Board (table) 0.8 m x 1.1 m	"	1
39	Calculator Calculator	"	5
40	Calculator Calculator	"	1

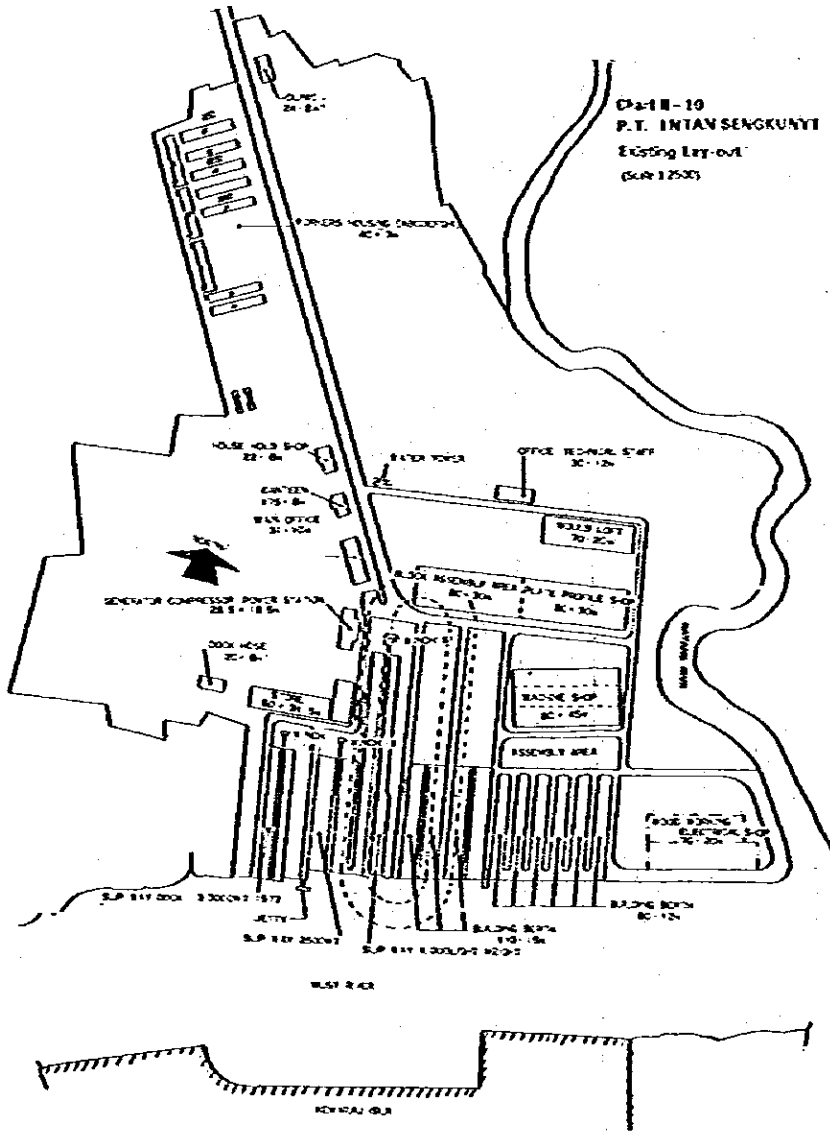
(4) MACHINERY & EQUIPMENT

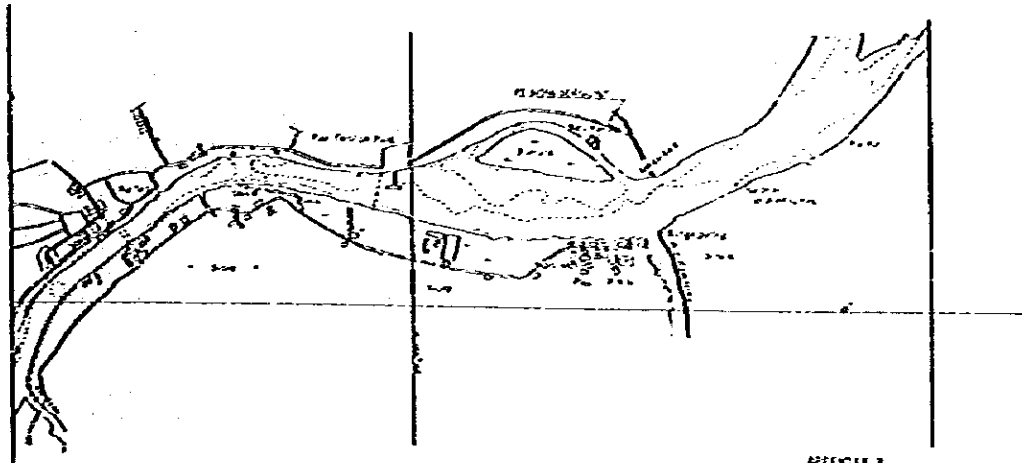
EX	TYPE CAPACITY	LOCATION	NUMBER
1	Profile bending mach 20 Ton	Pipe Workshop	1
2	Plate shear 10 m ² 1973	"	1
3	Rolling Press 3 Ton 1973	"	3
4	Punching Machine 1 Ton	"	1
5	Planer 600 m ²	"	3
6	Planer 600 m ²	"	1
7	Grinding Machine 6" 1974	"	1

(5) Utilities

Items	Capacity
Electric Power	自來電 1,600KW X 3 150KW X 1 600KW X 1
Bridging & Industrial Water Facilities	工業用水 M.S. River (Industrial water)
Compressed Air Facilities	Compressor X I 800m ³ /HR Mobil compressor X I
Acetylene & Oxygen Facilities	Cable 5T/month Copper 700 bottles/month
Water pollution Control Facilities	_____
Others	_____

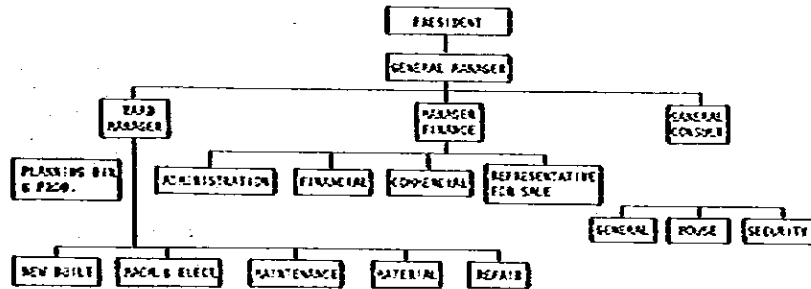
1) - (5) - "Utilities"
Supplied from the private power plant.
supplied from the public water-works





APPENDIX B

OPERATION
FT. INTAR SENSITIVE



APPENDIX C: LOADING LIST

- Principal Particulars of Hull Form
- General Arrangement
- Lines
- Hydrostatic Curves
- Change of Displacement by the Tonnage
- Correction Diagram for Tonnage and Air Shaft
- Calibration Scales for B.W.T., F.O.V., etc.
- Capacity Plan with Deadweight Scale
- Results of Deadweight Measurement Test
- Tonnage and Stability Data
- Cross Curves
- Manoeuvring Booklet
- Decking Plan
- Stability Section
- Construction Profile
- Shell Expansion
- Super Structure
- Stern Frame
- Bulker
- Arrangement of Modules
- Diagrammatic Arrangement of Suction and Mechanical Ventilation for Accommodation
- Diagram of General Rigging
- Diagram of Emergency Fire Pump System
- Test Result
- Arrangement of Steering Gear-room
- General Arrangement of Deck Machinery
- Inventory of Outfits
- Spare Parts and Tools List
- Diagram of Deck Scupper Pipe
- Voice Tube
- Painting Schedule

IV. P.T. 152004 SHIPYARD

1. General Situation

1-1. Introduction

This shipyard was formerly called P.T. RAJIN, and renamed into P.T. 152004 SHIPYARD in 1975 on the occasion of coming under the state enterprise as of P.T. ANGLINA SHIPYARD. In the P.T. RAJIN period, it was special repair works for small ships of the 400-5000/T class, and did not build new ships, though iron structure, steel frames, and globe-shaped tanks were being assembled and constructed there. For it is equipped with four units of 20000/T slipway of side track system arrayed on both sides, and the new-building turn-out recorded in 1975 is a total of five ferries or barges amounting to 1160 D/T & 255 Rp. Turn-out recorded in 1976 is six coasters and water lighters amounting to approximately 3000/T. The repair turn-over recorded in 1976 is 56 ships of 200 to 15000/T.

As shown in the shop lay-out drawing, there is an open space beside the main office, and the building work for the steel material storing area furnished with an outdoor crane planned by Mitsui Engineering & Shipbuilding Co., Ltd. to improve the working efficiency of plating shop is now under construction there.

1-2. Conditions of Location

The shipyard faces a canal of about 6 meters in water depth, and the total area of this shipyard is 100,000m². The building berth outside the side track slipway has a building capacity of four 2,000D/T ships at a time, each supposed to occupy a space of 50(11) x 20(5), though it is not equipped with a crane for the time being.

1-3. Shop Facilities

The shipyard has a side track slipway and a building berth therewith whose building and repairing capacity is 2000/T. At present the slipway is equipped with only one 8t crane, and the other outdoor facilities are one 80t mobile crane and one 3t fork lift.

The main shop buildings are shipbuilding work shop, machine work shop, wood work shop, etc., and shipbuilding div. furnished with one each of straightening roll (2000ca installed in 1964), bending roll (6000ca x 11ca installed in 1964), bending roll (2000ca x 6ca installed in 1964), and press (250t installed in 1963).

As for the rolling machines, a total of 8) electric rolling units (250-500ca) is now being employed. The units of lathe (ranging from 70ca x 600ca to 600ca x 7000ca) are also furnished.

The steel works seem to require reorganization and rearrangement for further improvement of the working efficiency, though it is well-equipped so far as the machine facilities are concerned.

In the crane, the main machines are rather old-fashioned, and most of them have been used for more than twenty years.

In the tool shop, the kinds of chipping hammer and riveting hammer and a large number of cogwheels, etc. which seem unnecessary are stored, though they believe it necessary to keep them for ready use in their repair work because of the unavailability on the market in case of urgent need.

1-4. Organization, Employees, and Labour Conditions

Their organization chart was not received, but according to the data filed with the Ministry of In-

dustry, this shipyard has a total of 215 employees, 106 for the hull construction work, 59 for the machine work, 40 for the electrical work, and 10 for the other tasks. The manning system is organized by a total of 22 staffs headed by a general manager, 2 for the hull construction work, 11 for the machine work, 3 for the electrical work, 1 for the accounting work, and 5 for the other managerial work.

They are on a five-day week, and work 40 hours a week. The extra wages for overtime work is 20% of the daytime work pay for the first hour, and 50% for the second hour onward. As for the holiday work, the extra wages are 100% for the first seven hours, and 200% for the eighth hour onward.

As for the medical security system, the employees and their families can receive medical treatment and medicine free of charge. The traffic expenses or commutation allowances are provided in accordance with the distance up to Rp 120.

1-5. Production Management and Production Technique

As previously stated, it was not until the shipyard came under the name of P.T. 152004 in 1975 that it started new-shipbuilding, and until then, it was engaged only in the repair work through iron structure, steel frameworks, and 500L I.P.G. gas tanks had occasionally been assembled, constructed, and installed therein. The production drawings are domestically designed, though the key plans for newbuilding ships are supplied from P.T. ANGLINA SHIPYARD, the sister shipyard.

There is no engineering technique deserving special mention herein except that they have been adopting a ball block construction system.

1-6. Production Efficiency and Term of Work

So far as the 2000/T class coasters built in 1976 are concerned, the average term of work from keel laying to launching is 1 month and a half, and that from launching to full completion is one and a half month. As a term, it seems to be satisfactory short, but according to the record, steel required one full year for its completion after the launching.

The annual record of repair work in 1976 says that a total of 55 ships ranging from 2000/T to 1400 D/T was repaired in this shipyard, and the number of ships repaired within ten to twenty days was 14. The next largest number of ships was 10 each repaired within ten days or within 21 to 30 days. Eight ships took a term of repair work from 31 to 40 days, and 13 other ships required more than 40 days before the completion of repair work.

1-7. Subcontractors

This shipyard employs a total of seven subcontractors, two each for the painting and scraping work, the machinery work, and the rigging work respectively, and one for the electrical work. The number of workers belonging to these seven subcontractors is 10 to 75, varying with the business conditions.

1-8. Design

The shipbuilding design work and other managerial work of approval, negotiation, etc. with the Ship-

owners and Classification Society for all of three sister shipyards are centrally supervised by P.T. ADIGUSA, and the production design work is left to each shipyard. But this is only an official stance, and the actual fact is that all the necessary drawings are being supplied from each shipowner. In most cases, the client shipowner of this shipyard is P.T. FER-TALHA, and F&WYAMA relies on KOBIN ICG for the required drawings. These drawings supplied from F&WYAMA are traced and used for obtaining approvals of the Classification Society and for the actual shipbuilding work in the yard. Therefore, the design ability of this shipyard is low, and the design staffs are only three designers and four draftsmen.

1-9. Material Procurement

As mentioned above, the main client shipowner of this yard is F&WYAMA, and the main engines and generators are usually supplied from F&WYAMA. The good part of the required steel materials are imported from Japan, and the term of delivery is three to five months. The welding rods, paint, wood materials, etc. are considered to be domestically available in relatively short terms of delivery, though the present stock volume of them is not clear.

110 QUESTIONNAIRE

1. General

- 1) Layout of shipyard (Appendix 1) P.V. INSOA SHIPYARD
- 2) Location and map (Appendix 2) Jl. Cakr R.E. Martadinata 1g-Prick Jakarta
- 3) Area: Area of premises 210.000 m²
Area of production "
- 4) Annual production capacity
New shipbuilding O/V (6/1)
Shiprepairing O/V (6/1)
- 5) Water depth: 6 m
- 6) Tide: Difference 0.5 - 1 m
- 7) Currents: No

- 2. Yard expansion plan: Yes New construction of steel storage area, crane and block assembly shop.
No

3. Organization and number

- 1) Tree diagram (Appendix 3)
- 2) Number of employees for each rank 535 in all
Director and manager persons
Section chief and sub section chief persons
Foreman and group chief persons
Worker persons
- 3) Training structure of education
S.B. Elementary school (6 years) persons
S.L.T.P. (S.M.P., ST ...) Secondary school (3 years) persons
S.L.T.A. (S.M.A., S.T.R.) High school (3 years) persons
ANAGRA College (3, 4 years) persons
DPR UNIVERSITY (4, 5 years) persons
- 4) Annual supply of B.A. and workers
B.A. 1971 1972 1973 1974 1975 1976
Workers

- 5) Overtime allowance for each hour
Working time: Mon.-Thu. 08:00-12:00, 12:30-16:30
Fri. 08:00-11:30, 12:30-17:00
Sat. Free 40% week
Week day: First one (1) hour 1.2 x day time one (1) hour
Over one (1) hour 1.5 x = hour
Holiday: Until seven (7) hour 2.0 x =
Over seven (7) hour 3.0 x =

- 6) Ratio of annual salary up abt. 15%
- 7) Welfare equipment Clinic available, workers and family
- 8) Meal supply Lunch: By food
Dinner:
- 9) Traffic expense Supply according to distance, max. three (3) times and via one (1) time of bus tariff Rp 40 a day.
- 10) Insurance No
- 11) Safety for worker No rate
- 12) Training of worker No training center
Upgrading of machine workers and welders of each ten (10) persons was held in 1975/1976

4. Sub-contractor

- 1) Kind of skill: Painting and scraping two (2) companies
Number of workers: Machinery two (2) companies
Welding: Electricity one (1) company
Refrating two (2) companies
Number of workers 30 - 75 persons in all
- 2) Degree of skill
- 3) Number of company 7 in all

5. Tools

- 1) Size of tool store
- 2) Main tools
a) Air
b) Electric
c) Hydraulic
d) Hammer, spanner, etc.

6. Productivity

1) New Shipbuilding

a) Man-hour

	Type, Kind, O/V of Typical Ships	Bill Weight	Man-hours (Bill Part)	Total Man-hour
I				
II				
III				

- b) Bill construction hours/ton
- c) Bill construction cost/ton
- d) Construction period
i)
ii)
- 2) Ship repairing
a) Total gross tonnage per years 67/year
b) Total man-hours per years hour/year
c) Total sales amount per years /year
d) Man-hour/steel ton (in the case of steel replacement): hour/ton
e) Cost/RT
f) Cost/ship
g) Repairing period i)
ii)

7. Material procurement

Item	Purchase Price	Where Purchased from	Order-to-Delivery time	Stock Amount
Rp in Engine	Over supply			
Generator	Over supply			
Steel Plate	Rp 135.000/RT at yard	Japan	3-5 months	
Profile	Rp 180.000/RT	Japan Sometimes local		
Welding Rod	Rp 350.000/RT	Local	Immediate	
Plate	Rp 2.500/RT	"	"	No
Pipe	"	"	"	"
Wood	Teak Rp 250.000/RT	"	1 week	No

8. Design

- 1) Number of designers Three (3) designers and four (4) drafters
- 2) Drawing list
- 3) Drawing method Pen
a) Photo copying machine Yes

9. Construction Techniques

- 1) Gas cutting work
- 2) Welding work
- 3) Gouging method
- 4) Fitting work
- 5) Farking work

10. Points to be noted on shipbuilding & repairing

- 1) Design by drawing from abroad for special one in that case some parts are not suitable for tropical water way. Revision of drawing unavoidable because of material.
- 2) Material procurement Delivery time of material uncertain. Sometimes stay from one (1) to four (4) months at port custom.
- 3) Construction No
- 4) Manpower shortage No
- 5) Unsatisfactory quality No
- 6) Schedule behind Sometimes behind in new building
- 7) Inspection trouble Sometimes repair welding after checking by X ray
- 8) Others No

(11) NEW SHIPBUILDING RECORDS (A-1-1) 1976

	NAME	OWNER	KIND	CLASS	D.V.	G.T.	LCA	B	D	ENGINE(D)
1		P.T. Atlantic Nickfield Indonesia	Roaring Boat	BCJ	11.76	-	13.00	8.35	2.36	275
2		P.T. Pengembang Arada Blaga Kasiprat	Coaster	"	950.00	-	59.00	11.40	6.15	1100
3		B.P.P. Lembaga Pekelikan Drua	Coaster	"	200.00	-	31.20	6.80	2.50	300
4		P.T. Adiguna Shipyard	Tanker	"	500.00	-	54.15	9.00	4.00	1100
5		P.T. Adiguna Shipyard	Water Lighter	"	500.00	-	18.80	8.00	2.80	200
6		P.T. Adiguna Shipyard	Water Lighter	"	500.00	-	18.80	8.00	2.80	200

NEW SHIPBUILDING RECORDS (A-1-2) 1976

NET RAL STEEL WEIGHT	PRICE	COST	Construction				Erection				DESIGN PER- IOD
			Con- tracting	Lauch- ing	Keel Laying	Deliv- ery	Null Fabr.	Erect.	Outfit.	Outfit.	
1	-	-	7 R.	12-1-76	2-12-76	13-5-76					
2	-	-	11 R.	30-3-77	27-7-76	-					
3	-	-	5 R.	17-12-76	2-3-76	3-2-77					
4	-	-	12 R.	30-7-77	30-3-76	-					
5	-	-	5 R.	15-4-77	14-2-77	-					
6	-	-	5 R.	30-4-77	14-2-77	-					

(12) NEW SHIPBUILDING RECORDS (B-1-1) 1976

NO	NAME	OWNER	KIND	CLASS	D.V.	G.T.	LCA	B	D	REPAIRING PERIOD	PERIOD IN DOCK
1		P.T. Pelajaran Kastrol Indonesia		BCJ	600.00	511.6					
2		P.T. Pan Nusantara Indonesia		"	716.00	638.0					
3		PT. Adiguna Shipyard		"	-	-				1	24
4		PT. Adiguna Shipyard		"	200.00	200.00				2	40
5		PT. Nagah Berlian		"	350.00	200.00				3	33
6		CV. Trana		"	200.00	150.00				4	20
7		PT. Pertamina		"	200.00	500.00				5	43
8		PT. Pelajaran G. Potong Jaya		"	53.28	150.00				6	15
9		PT. Pertamina Kongkard		"	800.00	400.00				7	120
10		PT. Adiguna Shipyard		"	900.00	600.00				8	65
11		PT. Sinar Saudra Jaya		"	500.00	218.00				9	52
12		PT. Pelajaran Sinar Pappo		"	1262.53	800.00				10	100
13		PT. Alcca		"	400.00	356.00				11	29
14		PT. Indorarine		"	600.00	540.00				12	77
15		PT. Pelajaran Saudra Indonesia		"	316.00	524.00				13	35
16		PT. Pertamina Kongkard		BCJ	900	400				14	30
17		PT. Sraita Engineering		"	1400	200				15	47
18		PT. Pelajaran Rasi Oral Indonesia		"	700	522.3				16	25
19		PT. Nagah Berlian		"	230	212.4				17	24
20		PT. Pertamina Kongkard		"	312.50	250				18	24
21		PT. Adiguna Shipyard		"	315.50	254				19	43
22		PT. Adiguna Shipyard		"	250	200				20	3
23		PT. Pelajaran Kastrol Indonesia		"	720	511.3				21	4
24		PT. Pelajaran Kastrol Indonesia		"	620	511.6				22	4
25		PT. Pertamina		"	900	600				23	20
26		PT. Alcca Miner's of Indonesia		"	800	364				24	10
27		PT. Pan Raha Lant		"	1400	200				25	16
28		PT. Indorarine		"	737	500				26	11
29		PT. Pelajaran Kastrol Indonesia		"	600	511.6				27	35
30		PT. Adiguna Shipyard		"	400	320				28	30
										29	3

SHIP REPAIRING RECORDS (B-2-1) 1976

NO.	NAME	OWNER	KIND	CLASS	D.V.	G.T.	LCA	B	D	REPAIRING PERIOD	PERIOD IN DOCK
31	KR.6 Poteng Jaya II	PT. Pelajaran Gunung Poteng Jaya		ECI	93.78	150					
32	LC. Mahala	PT. Adiguna Shipyard		"	400	375				31	18
33	Pusher Tug	PT. Adiguna Shipyard		"	-	-				32	6
34	KR. Pagoda	PT. Pelajaran Nasional Indonesia		"	650	544.6				33	5
35	NO. Ard Jura I.	PT. Atlantic Richfield Indonesia		"	-	-				34	28
36	KR. Sabang	PT. Palania		"	1800	700				35	21
37	KR. Pagoda	PT. Pelajaran Nasional Indonesia		"	700	522.3				36	19
38	TD. Shinta	PT. Adiguna Shipyard		"	317.50	254				37	30
39	PT. Destination	PT. Adiguna Shipyard		"	200	230				38	11
40	CR. Fair Island-1	PT. Pertamina Tongkang		"	950	400				39	10
41	KR. Partaran	PT. Palania		"	-	-				40	32
42	KR. Jilca	PT. Palania		"	700	500				41	23
43	KR. Engano	PT. Pelajaran Nasional Indonesia		"	700	514.3				42	34
44	PT. Starat II	PT. Pertamina Tongkang		"	700	400				43	41
45				"	150	200				44	43

SHIP REPAIRING RECORDS (B-3-1) 1976

NO.	NAME	OWNER	KIND	CLASS	D.V.	G.T.	LCA	B	D	REPAIRING PERIOD	PERIOD IN DOCK
46	EC. CR. PIR III	PT. Pertamina Tongkang		ECI	600	400					
47	TD. Redang-1	PT. Redang Bahera		"	155	92				45	13
48	TD. RD. II	PT. Redang Bahera		"	516.8	200				47	61
49	TD. RD. IV	PT. Redang Bahera		"	516.8	400				48	14
50	KR.6 Poteng Jaya I	PT. Pelajaran Gunung Poteng Jaya		"	93.78	150				49	24
51	KR. Senjung	PT. Palania		"	-	-				50	58
52	NO. A. Djura III	PT. Atlantic Richfield Indonesia		"	-	-				51	6
53	KR. Kenda Putra II	PT. Pelajaran Jangkar Sakli		"	610	215				52	50
54	LC. Atasena	PT. Adiguna Shipyard		"	400	370				53	-
55	TE. Cipta Jaya II	PT. Pelajaran Sinar Pagoda		"	352.50	242				54	15
56	TE. Cipta Jaya III	PT. Pelajaran Sinar Pagoda		"	1275	400				55	23

(1) LAND FACILITIES

0 BERTH & DOCK

NO.	NAME & TYPE	DIMENSION		MAX. SIZE OF SHIP				G.T.	D.V.T.	R USE
		L (R)	B (R)	APP (R)	B (R)	D (R)	d (R)			
0	Rolling berth	80	20							

R USE : Building (B), Repairing (R), Building & Repairing (B & R)

(2) CRANES

	R TYPE	MAX. LIFT LOAD	MAX. ELEVATION	MAX. REACH	N. Ber	LOCATION
1	P.C.	80 TON			1	
2	B.W.C.	5 TON			2	
3	"	3 TON			1	
4	"	1 TON			2	
5	P.C.	8 TON			1	
6	PILE CRANE	3 TON			1	

Type: Portal crane (P.C.) Over Crane (B.W.C.), Tower Crane (T.C.)

Level lifting crane (L.L.C.) * L = Slab Crane (L.C.) Mobile Crane (M.C.)

(3) YARD & SHOP

Stage & Shop	Total area	Shop area	Slab area
Shipbuilding			
Steel stock yard			
Fabrication shop			
Subassembly shop & yard			
Assembly shop & yard			
Grand assembly yard			
Block stock yard			
Berth & Dock			
Ripe stock yard			
Machinery shop	70x30x1 (5x25x1)		
Carpenter shop	50x25x1 50x25x1	70x30x1	
Plater shop	75x35		
Electrical shop	15x10x1		
Painting shop			
Outfitting shop			
Blasting shop			
Iron & Casting shop	15x10x1 15x10x1		
Warehouse	30x25x1 15x25x1		
PIPE SHOP	30x20x1		
MOULD LOFT	30x15x1		
PLATING ROOM	15x20x1		
Repairing			
Berth & Dock			
Mill shop			
Machinery shop			
Outdoors working area			
Stockyard			
Warehouse			
Overhaul			

MACHINERY & EQUIPMENT

	TYPE CAPACITY	LOCATION	NUMBER
24	Automatic Cutting Torch	Welding shop	4
25	Cutting Torch	"	25
26	Cutting floor 150 m ²	"	2
27	Crawler crane/tire crane 5 TON	"	3
28	" " 10 TON	"	1
29	Portal crane 8 TON	"	1
30	Mobile crane 80 TON	"	1
31	Air Arc Gauging Machine 500 A	"	2
32	pipe bending rack 1/2" - 1/2"	1970 pipe shop	1
33	Grinding rack 200 m ² 196A	"	3
34	Bending table 9 m ²	"	1
35	Drill 23 m ² 196A	"	3
36	Working table 75 x 200cm	"	1
37	Burner	"	2
38	Back saw 150 cm 1965	"	1
39	Thread cutting rack 1 1/2 x 600cm 196A	"	3
40	Tap & dies	"	3
41	Overhead crane 3 TON	"	6
42	Lathe 600x2000mm 1965	Machinery SHOP	1
43	" 400x1000mm 1965	"	1
44	" 180x300mm 1965	"	1
45	" 150x1500mm 1966	"	6
46	" 200x600mm 196A	"	1
47	Vertical Drilling Rack 25mm 1965	"	5

(4) MACHINERY & EQUIPMENT

SL	TYPE CAPACITY	LOCATION	NUMBER
1	Sand Blasting 70sqm ²	1965 PLATER SHOP	2
2	Straightening Roll 200x15m	196A	2
3	Bending Roll 600x15m	196A	1
4	" 200x 6m	196A	1
5	Plate Shear 16m	196A	1
6	Profile Shear 100x130x10	1963	1
7	Roll press 250 TON	1963	1
8	Pneumatic chipping chisel 8sq/cm ²	196A	20
9	Drilling Machine 23mm	196A	3
10	Punching Machine 15mm	1965	1
11	Grinding Machine 200mm	196A	6
12	Ferrace 2000x1300mm	196A	1
13	Working table 425m ²	"	1
14	Overhead Crane 5 TON	"	2
15	" 2 TON	"	1
16	Welding Generator 350	1965 Welding shop	3
17	" 300	197A	2
18	Welding Generator 250A	1971	22
19	" 500A	1971	34
20	Welding Converter 800-500A	1963	22
21	Welding floor 350m ²	1963	2
22	Acetylene generator 5 kg	1975	11
23	" 10 kg	1963	2

MACHINERY & EQUIPMENT

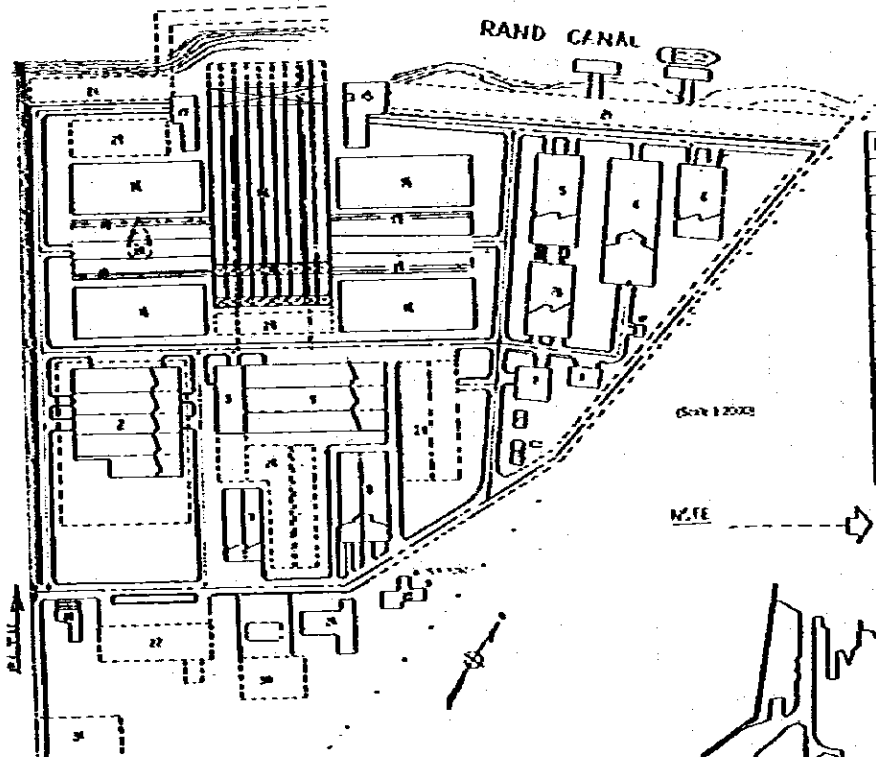
	TYPE CAPACITY	LOCATION	NUMBER
48	Horizontal Drilling Rack 500mm 1965	Machinery SHOP	2
49	Vertical Drilling Machine 300x230mm 1965	"	3
50	Table Planer 2 x 5m 196A	"	1
51	Press 5 TON 1965	"	1
52	Back Saw 150mm 1965	"	1
53	Toot Grinding Machine 200mm 196A	"	1
54	Grinding Machine 200mm 196A	"	3
55	" 300mm 196A	"	1
56	Portable Boring Rack 5" x 3.5"	"	1
57	Overhead crane 5 TON	"	1 & 04
58	Portable Key Drilling Machine 25x250mm	"	1
59	Wood lathe Max 150x1200 196A	CARPENTER SHOP	3
60	Circular saw 250 196A	"	2
61	Saw mill Max 80m 196A	"	1
62	Band saw Max 3cm 1965	"	2
63	" Max 2cm 196A	"	1
64	Planing rack 15cm 196A	"	1
65	" 60 x 10 196A	"	2
66	Drill Max 12mm 196A	"	1
67	Sanding rack 1m 196A	"	1
68	Drilling rack 400x15x10 196A	"	1
69	Overhead Crane 1 TON	"	1
70	Drilling Machine 2 m ²	IRON & CASTING SHOP	1
71	Castiron melting furnace 2.2 TON/h	"	1

MACHINERY & EQUIPMENT

NO	TYPE CAPACITY	LOCATION	NUMBER
72	Non ferrous melting furnace 200kg	TRUCK & CASTING SHOP	1
73	Mold Table 50 x 8.500m 1961	"	2
74	Overhead Crane 10 Ton	"	1
75	Furnace 81.5 KW	ELECTRICAL SHOP	1
76	" 6.5 KW	"	1
77	Drilling (manual) 1-10mm 1963	"	10
78	Battery Charger 24V/160 1965	"	2
79	Latent garbar 36 x 18 m	MOULD LOFT	1
80	Band saw 5m	"	1
81	Roller garbar 7.5 x 1 m	"	5
82	Resin Cetak Garbar 110x70x4	BRUING ROOM	1
83	Resin Mixing Millivet	"	1
84	" ELECTRIC Calculator	"	5
85	Flanometer	"	1
86	Resin-Bik Kenington	"	1

(5) Utilities

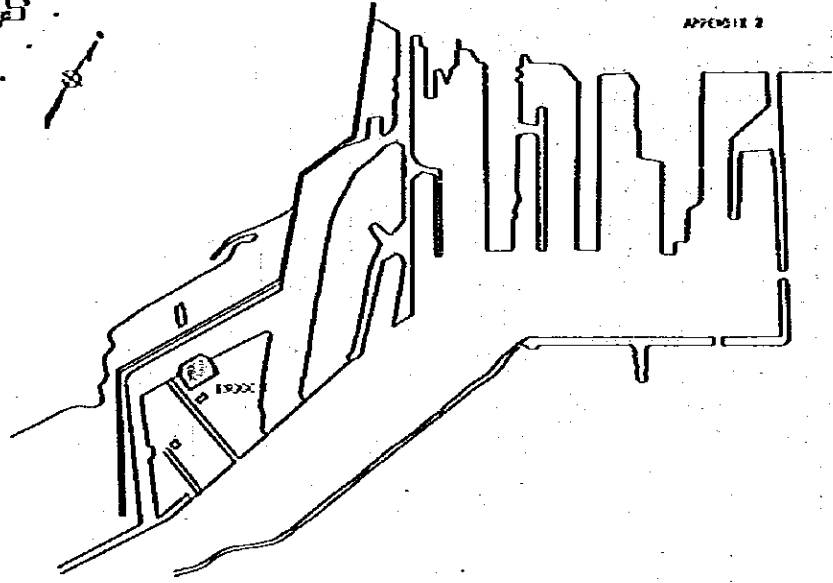
Items	Capacity
Electric Power	P.T.B. No. Generator 625 K.V.A. x 2, 80 K.V.A. x 2, 96 K.V.A. x 1, 40 K.V.A. x 2
Drinking & Industrial Water Facilities	City water for drinking by track 2 Ton/day Industrial water from deep well 60 Ton/day
Compressed Air Facilities	
Acetylene & Oxygen Facilities	Acetylene 7 bottles/day 1 bottle = 6 m ³ Carbide 200 kg/day Oxygen 40 bottles/day
Water pollution Control Facilities	No
Others	No



NO	REMARKS
1	SHOP BUILDING WITH CRIP
2	WIP WORK SHOP & FINE GRIND SHOP
3	SHOP BUILDING WITH CRIP
4	WORKING WITH CRIP
5	WORKING WITH CRIP
6	STORE
7	CAR REPAIRING & MAINTENANCE
8	WORKING WITH CRIP
9	WORKING WITH CRIP
10	COMPRESSOR ROOM
11	FUEL OIL STORAGE
12	WORKING WITH CRIP
13	CRIP
14	CRIP
15	CRIP
16	CRIP
17	CRIP
18	CRIP

NOTE → PLANS 1977 until 1980

NO	REMARKS
19	CRIP
20	CRIP
21	CRIP
22	CRIP
23	CRIP
24	CRIP
25	CRIP
26	CRIP
27	CRIP
28	CRIP
29	CRIP
30	CRIP
31	CRIP



V. P.T. ABIGONA SHIPYARD

1. General Situation

1-1. Introduction

This shipyard is originally designed only for newshipbuilding, and is not equipped with any facilities for repair work. The newshipbuilding turn-over recorded during the five years from 1971 to 1975 is three ships of 12000/G for the year 1971, seven of 25000/G for the year 1972, thirteen of 23500/G for the year 1973, six of 14550/G for the year 1974, and fifteen of 40650/G for the year 1975. Thus the business turn-over is greatly increasing, and the annual consumption of steel materials is nearly five-folded in these five years. At present, as many as nine ships are on the berth and another nine at the outfitting quay, though eight of them are kept waiting for the arrival of necessary machinery and very few of them are under work.

The shipyard is now energetically participating in various kinds of tender collect orders, because the orders for newships already booked and waiting for keel laying are only three.

The working efficiency will drastically be improved by decreasing the number of ships and supplying the service on the berth cranes, instead of such recurrent building of no less than nine new ships even though they are smaller than 10000/G.

This shipyard is supplied with no electric power from any external sources, and all the necessary electricity to cover from lighting to motive power relies on the private power plant of its own.

One of the problems requiring urgent solution is reinforcement of the poor quaying facilities to improve the efficiency of outfitting work, though this seems essential not only to this shipyard but also to all the others. From a managerial point of view, the inauguration of repair work should also be investigated, in consideration of the present economic situation making the collection of orders for newshipbuilding quite difficult.

1-2. Conditions of Location

The area lying on the west of this shipyard is already filled for the expansion plan to construct another slipway capable of building two 10000/G class ships at a time. The working space in this shipyard is scarce in comparison with the total shipbuilding area and with the amount of orders secured so far. So it seems difficult to furnish the slipway with a new crane. In order to improve the working efficiency, it is desirable to decrease the number of ships on the berth and furnish the slipway with a new crane. The distance to the other side of the canal is about 200 meters, and the launching of large vessels requires anchor stepping though small vessels less than 10000/G can be launched without any anchor stepping.

1-3. Shop Facilities

This shipyard has only three to four slipways made of rectangular timbers approximately of 250mm in thickness arranged on the concrete base,

and all the other slipways are more shabby without even the base, though they are called permanent berth. The quays are poorly equipped with outfitting facilities, and requires urgent reinforcement. The present buildings in this shipyard are the steel outfitting shop, the machine shop, and the drawing room. The machine shop is furnished with only one unit of 100 O.H.C., and all the other O.H.C. work is covered by the outdoor crane. The hull assembly work is carried out in open space. The mould loft room is on the third floor of the office building, and the floor space is 20m x 50m. The ceiling is low and not well-lighted. The shipyard employs a total of 163 electric welders rating from 100A to 550A, and of 10 lathes ranging from 250mm x 1m to 1000mm x 5m. The lathes are relatively new. It also employs one unit each of 15mm bending roll, die cutter, and 200t press.

1-4. Organization, Employees, and Labour Conditions

One secretary and four staffs are working under the supervision of president director, and four directors respectively responsible for the commercial, general, logistic, and production managements are assisting them. The production director manages four departments respectively supervised by design and construction manager, field manager, administration manager, and new building coordinator. The field manager manages three sections of hull, machine and electric engineering, and design as well as calculation staffs directly belonging to him, and a total of 40 section staffs are working in these three sections. The calculation staffs consist of seven shipbuilding engineers, three machine engineers, two electric engineers, and one business administration expert, and most of these thirteen staffs are young specialists aged about 30. Five of them are college graduates (five-year courses), and another five are academy graduates (three-year courses).

As for the welfare service, the working uniforms are supplied annually to each employee, and lunch are served on the house. In the case of overtime work, supper is prepared by the shipyard. President, directors, and managers can individually use a car, and section chiefs and staffs reaching higher than them can use a car only for commutation purposes.

During the six years from 1971 to 1976, neither college graduates nor ordinary workers have been newly employed.

1-5. Production Management and Production Technique

At the time of our inspection, the shell plate fitting work of a 10000/G class tanker was going on, and the bending technique of the bilge plates seemed quite satisfactory. We were told that these bilge plates were processed at P.T. ABIGONA SHIPYARD (one of the sister shipyards to P.T. ABIGONA). We did not witness the actual use of the automatic gas cutting machine, but the cut surfaces we inspected were rather offensive. The external appearance of the cutting leads were quite agreeable.

As for the method of assembling blocks (approximately 10 frame spaces in length) of carcass frame-

work side of girders, beams, and frame slots into a hull of carcasses on the berth and then attaching thereto the shell plates one by one, the productivity of working efficiency will be further improved if a block building system containing carcasses with shell plates is introduced.

The other points noted were the seven sets of training facilities for welding work installed in one section and the incomplete rollers kept waiting for machine processing in the machine shop.

1-5. Production Efficiency and Term of work

The productivity or capacity of shipbuilding work is said to be 200-250 tons. The term of work widely varies with various conditions. For instance, one 4000-ton oil barge (32.832 x 8.838 x 2.412) required a term of work of two months from keel laying to launching and of six months from launching to its completion, and another 200-ton tug boat (21.624 x 6.253 x 2.610) required a term of work of nine months from keel laying to launching and of seventeen months from launching to its completion. The past records show that the average term of work from keel laying to completion is one year or more.

1-7. Subcontractors

For the time being, no subcontractor is being employed, and all the work is being carried out by the direct employees. With regard to steel outfitting, however, all the work is left to P.T. ENDOGAN, a subcontractor, including designing work and steel material procurement. According to the past record, there was a special case in which only the hull was

built in this shipyard and all the machine and outfitting work was left to P.T. ENDOGAN. This suggests the relative insufficiency of capacity in the shipbuilding work to that in the outfitting work.

1-8. Design

According to the organization chart, the design department is under the supervision of production director, and divided into sections of hull, machine and electrical engineering, and calculation. Most part of the design work is tracing, and at the time of our inspection, they were tracing a shell expansion drawing secured from Singapore and an arrangement drawing of a patrol boat from the Government. Enough time was allocated to the tracing work, and the whole drawing was inked in. The drawing technique seemed quite excellent.

1-9. Material Procurement

The main materials such as machines, sub-machines, steel plates, steel profiles, etc. are directly imported from Japan, and the term of delivery after placing orders is two to six months. The welding rods, paint, wood materials, etc. are purchased from the domestic distributors, and the term of delivery is approximately one week. The present stock is 5000 of steel plates, 200 of steel profiles, and 70 of welding rods. The steel plates are casually piled up in the open space, and the storing condition is not good.

III QUESTIONNAIRE

1. General
 - 1) Layout of shipyard (appendix 1) P.T. ADIGANA SHIPYARD
 - 2) Location and map (appendix 2) Jl. Sindang Laut-Tanjung Priuk Jakarta
 - 3) Area: Area of premises
Area of production
 - 4) Annual production capacity
New shipbuilding 3000 B/W
Shiprepairing No B/W (6/1)
 - 5) Water depth:
 - 6) Tide: No problem
 - 7) Current: "
2. Yard expansion plans: Yes
No
3. Organization and number
 - 1) Tree diagram (appendix 3)
 - 2) Number of employees for each rank 305 in all
 - Director and manager 11 persons
 - Section chief and sub section chief 31 persons
 - Staff 11 persons
 - Worker 255 persons
 - 3) Ranking structure of education
 - S.D. Elementary school (6 years) persons
 - S.U.T.P. (S.U.P., ST ...) Secondary school (3 years) persons
 - S.U.T.A. (S.M.A., S.T.A.) High school (3 years) persons
 - MAJEM College (4, 5 years) persons
 - UNIVERSITY (4, 5 years) persons
 - 4) Annual supply of B.A. and workers

	1971	1972	1973	1974	1975	1976
B.A.	No	"	"	"	"	"
Workers	No	"	"	"	"	"
 - 5) Overtime allowance for each hour
 - 6) Ratio of annual salary up
 - 7) Welfare equipment
 - 8) Meal supply
 - Lunch: Supply
 - Dinner: Supply
 - 9) Traffic expense
 - President - Manager: One (1) person one (1) car supply
 - Above sub section chiefs: In the same car
 - 10) Insurance
 - 11) Safety for worker
 - Government rule
 - 12) Training of worker
 - Has training center for ADIGANA group
4. Subcontractor
 - 1) Kind of skill: Carpenter job including design and material
Number of workers:
Wage:
 - 2) Degree of skill
 - 3) Number of company
5. Tools
 - 1) Size of tool store
 - 2) Main tools
 - a) Air
 - b) Electric
 - c) Hydraulic
 - d) Hammer, spawer, etc.
6. Productivity
 - 1) New Shipbuilding
 - a) Man-hour

	Type, Kind, B/W of Typical ships	Null Weight	Man-hours (Null Part)	Total Man-hour
I				
II				
III				

- b) Null construction 200 - 250 H Hours/Ton
- c) Full construction \$ 835 - 1000 Cost/Ton
- d) Construction period
 - i) Top Seat 21% Eight (8) months
 - ii) Tanker 35% 2000/H Twelve (12) months
- 2) Ship repairing
 - a) Total gross tonnage per year: \$/year
 - b) Total man-hours per year: hour/year
 - c) Total sales amount per year: /year
 - d) Man-hour/steel ton (in the case of steel replacement): hour/ton
 - e) Cost/\$T
 - f) Cost/ship
 - g) Repairing period: i)
ii)

7. Material procurement

Item	Purchase Price	Where Purchased from	Order-to-Delivery time	Stock Account
Main Engine	\$150/HP €40	Nilgata (Direct)	3 months F.O.B. 2 months in Harbour	-
Generator	\$200/KA	Nits-Bishi (Direct)	5 months	-
Steel Plate	\$300/Ton \$500/Ton	Japan (Direct) Local	6 months Immediate	500 Ton
Profile	\$100/Ton	Japan (Direct)	6 months	20 Ton
Welding Rod	\$300/Ton	Local	1 week	7 Ton
Paint	\$5-6/kg	"	"	80
Pipe	"	"	"	50 Ton
Wood Jati	\$ 65/m ³	"	"	No

8. Design

- 1) Number of designers
- 2) Drawing list
- 3) Drawing method
 - Pen
 - Pencil
- 4) Photo copying machine

9. Construction Techniques

- 1) Gas cutting work
- 2) Welding work
- 3) Boring method
- 4) Fitting work
- 5) Parking work

10. Points to be noted on shipbuilding & repairing

- 1) Design
- 2) Material procurement
- 3) Construction
 - 4) manpower shortage Staff and unskilled labour are enough but skilled labour short.
 - 5) Unsatisfactory quality Still not satisfy. Quality control must be done by line member.
 - 6) Schedule behind Usually behind one (1) week.
 - 7) Inspection trouble Sometimes result of X ray is not good.
 - 8) Others
 1. Lack of training center. And also after trained he works at another company to get much money.
 2. Lack of skilled foreman who can lead workers well.

(11) NEW SHIPBUILDING RECORD (A-1-1) 1976

	NAME	OWNER	KIND	CLASS	D.V.	G.T.	CGA	B	D	ENGINE (HP)
1	Shieta	P.S.R.	Tug Boat 20'x50'x9'	B.R.C.	20	21.07	23.62	6.25	2.47	850
2	Elran A	P.T.R.	Tug Boat 88'	B.R.C.	35	137.95	29.45	7.40	3.30	1300
3	Eltan-dy	Port Authority (Binas Palabuan)	Tug Boat 88'	B.R.C.	35	137.95	29.45	7.40	3.30	1700
4	Rafaja W	P.S.R.	Farler 500 GWT	B.R.C.	500	-	64.15	9.00	4.00	1150
5	Baya 1	Pertamina Security	Fire Boat	B.R.C.	15	118.29	27.50	6.50	2.80	950
6	te-Rar	Nielaty of Communication	Ferry Boat	B.R.C.	322	-	45.58	11.00	3.20	750
7	P.T.B. Agapora 11	P.V. Aquaria Shipping	Flat Top Barge	B.R.C.	1300	-	49.26	15.25	3.65	-

NEW SHIPBUILDING RECORDS (A-1-2) 1976

SET NO.	GRL STEEL WEIGHT	PRICE COST	CONSTRUCTION SCHEDULE				CONSTRUCTION MAN-HOURS						DESIGN MAN-HOUR
			Con-tract	Con-structing	Keel Laying	Deliv-ery	Full Fabric.	Full Erect.	Full Scaff.	Deck Outfit.	Elect. Outfit.	Paint	
1	60		30/5-73	29/7-74	18/6-73	3/11-76	5655.6	6590.4	9100	4334	4265		
2	155		30/2-73	30/2-74	8/2-74	-	8100	5400	4200	11300	1700		
3	105		30/5-74	6/3-75	25/4-74	-	9000	6000	4200	11300	1700		
4	290		1/13-75	2/10-77	3/2/8-76	-							
5	73		7/5-74	2/11-76	2/12-74								
6	277		23/1-74	26/3-75	3/3-75	4/7-76	12024.4	11329.6	13112	27450.5			
7	60			30/1-76	11/7-76								

(12) YARD FACILITIES

1. BERTH & DOCK

NO.	NAME & TYPE	DIMENSION		MAX. SIZE OF SHIP						G.T.	D.V.T.	USE
		L (M)	B (M)	LPP (M)	B (M)	D (M)	d (M)	G.T.	D.V.T.			
1	Building Berth	50	10									
2	"	55	12									
3	"	70	12									
4	"	75	13									
5	"	60	30									
6	Slipway-berth	129	15									
7	"	"	"									

* USE = Building (B), Repairing (R), Building & Repairing (B & R)

(2) CRANES

	# TYPE	MAX. LIFT LEAD	MAX. ELEVATION	MAX. REACH	Number	LOCATION
1	P.C.	5 TON			1	
2	"	10 TON			2	
3	"	15 TON			1	
4	B.R.C.	10 TON			1	
5	Fork Lift	6 TON			1	

Type: Portal crane (P.C.) Over Crane (B.R.C.), Tower Crane (T.C.)

Level Luffing crane (L.L.C.) - A - Ship Crane (S.C.) - ASST Crane (A.C.)

(3) SHED & SHOP

Stage & Shop	Area (sq')		
	Total area	Shop area	Slab area
Shipbuilding			
Steel stock yard			
Fabrication shop			
Subassembly shop & yard			
Assembly shop & yard			
Grand assembly yard			
Block stock yard			
Berth & Dock			
Pipe shop	221		
Pipe stock yard			
Machinery shop	1300		
Carpenter shop	96		
Plater shop	1000		
Electrical shop	150		
Painting shop			
Outfitting shop			
Rigging shop			
Iron & Casting shop			
Warehouse	700 x 1 500 x 1		
Welding shop	260 x 3 75 x 0		
Road loft	1000		
Bracing room	160		
Recycling			
Berth & Dock			
Roll shop			
Machinery shop			
Outdoors working area			
Stockyard			
Warehouse			
Barrel			

(4) MACHINERY & EQUIPMENT

ITEM	TYPE CAPACITY	LOCATION	NUMBER
1	Sand blasting 11 kg/cm ² 1975	PLATER SHOP	0
2	Bending Roll 16 mm 1972	"	1
3	Profile bending mach 2 TON 1974	"	0
4	Profile Shear 12-5 mm 1972	"	1
5	Roller press 200 TON 1971	"	1
6	Pneumatic Chipping chisel 7-8 kg/cm ² 1971	"	0
7	Grinding Machine 22 mm 1971	"	18
8	Working table 9 m ²	"	2
9	" 22 m ²	"	1
10	" 30 m ²	"	4
11	Welding transformer 250 A	WELDING SHOP	24
12	" 300 A	"	43
13	" 400 A	"	12
14	" 500 A	"	58
15	" 550 A	"	10
16	" 150 A	"	6
17	Welding floor 300 m ² 1973	"	1
18	" 600 m ² 1975	"	1
19	Acetylene generator 2.5 kg	"	87
20	Automatic cutting torch	"	22
21	Cutting torch	"	49
22	Cutting floor 300 m ²	WELDING SHOP	0
23	Pipe bending mach 12.7-50.8 mm	PIPE SHOP	1
24	" 12.7-25.4 mm	"	1
25	Bending table 1.25 m ²	"	2
26	Drill 12.7-25.4 mm	"	2
27	Working table 2.5 m ²	"	3
28	Burrer	"	2
29	Lathe 200mm x 0.75M 1958	MACHINERY SHOP	1
30	" 1000mm x 5.0M 1960	"	1
31	" 600mm x 0.75M 1970	"	1
32	" 300mm x 0.75M 1971	"	1
33	" 500mm x 0.0M 1973	"	2
34	" 250mm x 0.0M 1961	"	1
35	Turret Lathe 600mm x 2.65M 1970	"	1

MACHINERY & EQUIPMENT

	TYPE CAPACITY	LOCATION	NUMBER
36	Turret Lathe 600mm x 2.65M 1970	MACHINERY SHOP	1
37	" 1000mm x 5.0M 1972	"	1
38	Vertical Drilling Mach. 12.7m x 25.4m 1973	"	2
39	" 3.15m x 25.4m 1974	"	1
40	Horizontal Drilling Mach. 100m 1973	"	1
41	Radial Drilling Machine 38.1m 1971	"	1
42	" 65m 1971	"	1
43	Horizontal Drilling Mach. 250m x 40m 1958	"	2
44	Table planer 2 x 1	"	2
45	Rock Saw 300m 1972	"	2
46	Tool Grinding Machine 2.54m 1974	"	1
47	Grinding Machine 200m 1972	"	3
48	" 200m 1975	"	1
49	Portable Spring Mach. 500m x 7.5M	"	3
50	Overhead Crane 10 ton	"	1
51	Circular Saw 10m 1975	CARPENTER SHOP	1
52	Planing Mach. 12m 1975	"	1
53	Drill 0.0m-1m 1975	"	1
54	Sanding Mach. 10m 1975	"	3
55	Sealing machine for tarpulin 1972	"	2
56	" 1974	"	2
57	Drilling (manual) 12m	ELECTRICAL SHOP	3
58	Bracing force 50M x 0.5M	ROAD LEFT	1
59	Bracing board (table) 150m x 90m	DEPARTING ROOM	12
60	Bracing printing machine (blue print) 0CC	"	1 (table)
61	"	BERCH	"
62	Calculator Logos (Bilbert)	"	2
63	Planimeter	"	1 ATT
64	Integrator	"	1 (table)
65			
66			
67			
68			
69			
70			

(5) Utilities

Items	Capacity
Electric Power	P.L.V. No supply Generator 550 K.V.A. x 2 262 K.V.A. x 1 180 K.V.A. x 1
Drinking & Industrial Water Facilities	Deep well only 20 forday
Compressed Air Facilities	
Acetylene & Oxygen Facilities	Use Acetylene from carbide Oxygen from outside
Water pollution Control Facilities	
Others	

VI. P.T. PABRIK KAPAL INDONESIA (P.T. PABRI)

1. General Situation

1-1. Introduction

P.T. PABRI was established in 1924 as a shipyard of Dutch Marine Company (N.V.), and was later a governmental possession in 1950 under the name of P.T. Patrik Kapal Indonesia. Thereafter it was incorporated into the present P.T. Patrik Kapal Indonesia in 1975. The turn-out of newshipbuilding recorded during the five years from 1971 to 1975 is 8000/MT of four ships in the year 1971, 4200/MT + 14250/MT of two ships in 1972, 8200/MT of nine ships in 1973, 20100/MT + 90500/MT + 5000/MT of fourteen ships in 1974, and 20000/MT + 10000/MT of four ships in 1975. The volume of steel material for newshipbuilding and repair work consumed in the years 1972 and 1973 is roughly doubled in the next two years.

Specified below are ships whose building or outfitting work was in progress when we inspected this shipyard.

Cargo passenger coaster	950 D.W.T.	Under outfitting
Passenger & ferry boat	26m L for 60 passengers	-
River passenger & car ferry	27m L	-
Water barge with motor	430 D.W.T.	-
Water barge with motor	630 D.W.T.	On the berth
Fishing boat (Springtrawler)	12m L x 2	Keel laying on 12th Oct.
Motorized carrying log barge	150 D.W.T.	On the berth
Passenger launch	12m L x 2	Keel laying on 15th Oct.
Fiberglass boat (Spring trawler)	16m L x 20	Under model making

At the time of our inspection, the new building yard for fiberglass boats was under construction where the old berth for small-sized ships once stood, and the model making for fiberglass boats was in progress. This shipyard is making full use of the old-fashioned facilities, and has been making a good showing by the sound and steady business management.

1-2. Conditions of Location

This shipyard is located quite inconveniently in the innermost recess of a canal, and it usually takes five to six days to go down the canal to the sea, and it sometimes takes no less than ten days because there are so many sailboats laid-up along the canal.

The mooring facilities of this shipyard are insufficient and the sea surface nearby are covered with so many floating matters that it seems almost impossible to discriminate it from the ground surface, though top of the site surrounding this shipyard are said to be usable as outfitting yards. Each year they are dredging near the quays to maintain the required water depth. The products of the yard is narrow, and various kinds of scraps are scattered here and there. The bad leveling of the ground and the uneven roads are making the working environment even worse. It is said that they are planning to purchase 12,000m² (30m x 50m) of land near the entrance of the canal for the future removal of the shipyard to solve the problem of the bad water traffic condition in the present canal.

1-3. Shop Facilities

- 1) Berths: 1-berth of 1,500 DWT side-lanching system without rail or any other equipment, is provided. Just giving a slight slope to the ground, the construction is very simple.

In case of lanching rails and trucks are fixed for temporary use.

- 2) Docks: 2-Docks of 750 DWT for repairing of concrete construction provided with steel gates. It takes 4 to 5 hours to drain a dock by means of 2 pumps provided on the dockside. It seems that several ships are waiting for docking because of large order for repairing. Priority is given to the new equipment for repair ships.

- 3) Cranes: All cranes are of crawler type. 1-25T, 2-35T, 1-10T and 1-20T floating cranes are provided.

- 4) Workshop: Workers' room and the glazer shop are contained in the same building and located on the ground floor and upstairs respectively.

In the carpenter shop material woods are cut into size in through process and not a single lumber is purchased from outside.

The area of finish and assembly shop is 4,275m² (15m width x 285m long), the flow of materials are carried out by the rear beam cranes.

The surface tables for work are also of grid groove type taking easy work fixing into consideration. The presses are arranged along the flow of work. The machine shop and the fittings shop are located in the same building. The building and the equipment installed are considerably old.

- 5) Work Spots: The finishing and assembly work is carried out on the steady surface tables. This is an ideal equipment. Not a single equipment is provided on the berth except for some ladders. There is a wide difference between the assembly shop and the berths.

- 6) Welding Machines: Provided with the welding machines of various type, but most of them are of transformer type. The maintenance of the welding machines including other machines is not good.

- 7) Gas Cutting Machine: All machines are of manual type. Cutting accuracy is not so good.

Paint is applied to ladders immediately after cutting. That is a matter that calls for their careful consideration.

- 8) Electricity: Depend on commercial supply from outside. Even if the new equipment has a sufficient supply capacity, an emergency generator should be provided.

- 9) Water: Industrial water is pumped up from the well because of poor municipal water supply. Even if the capacity of municipal water supply increases in future, deep wells are necessary.

- 10) Oxygen and acetylene gas. Both oxygen and acetylene gas are purchased in bottles from outside.

1-4. Organization and Labour Force

- 1) Organization: Representative director preside over 2 Directors of business and production major departments who supervise the organization assisting representative director. The organization is classified into 4 divisions or Accountance, General Affairs, Planning and Manufacturing.

What is worth notice is Planning departments.

Planning is comprising 3 divisions or Material purchasing and Design, Production Planning and Control.

It is preferable to separate design from planning and to put planning under Director as his staff. While, the personal organization of planning is very important. Planning needs engineers who have mastered shipbuilding viewed in conservative aspect.

Because of a favourable location in such a big city as Jakarta they depend on the extra workers from subcontractors. It seems quite difficult for other local shipyard, to depend on the extra workers. Thus, the fluctuation of the work amount is controlled.

The number of design member is as follows:

Hull and Rigging: 5, Engineer: 3, Electric Equipment: 1 Total 9

Some drawings are purchased from outside when necessary.

- 2) Working Hours: 7:45 to 15:45 from Monday to Thursday (lunchtime: 11:45 to 12:14). 7:45 to 15:45 on Friday (lunchtime: 11:45 to 12:15). Closed on Saturday and Sunday. Weekly working hours is 37 hours.

At present a coaster of 5500MT is moored at the quay. Although almost eleven months have past, only 50% of repair work has been so far finished.

This is said to be due to such trouble as delivery delay of machine, design alteration made by ship owner. After looking over the ship, it was learned, that the work is actually delayed. Further increase of working hours or working on Saturday is desired.

- 3) Workers: The shipyard was established in 1928, since then more than 50 years have passed. PAHII seems to be one of the oldest shipyard in Indonesia. The old equipment attracts our notice all the more because the shipyard is so old.

Not a single regular worker has been employed since 1971. That is why so many middle and advanced aged worker are working there. As to a school career, 201 workers (more than 50% of workers) finished primary course only.

Arrangement, maintenance of equipment and discipline in the workshop, still leave something to be desired.

1-5. Production Control and Technical Level

- 1) No written shipbuilding instructions are made. The barges under construction are built by dividing into two pieces at midship section.

Small ships like tug boats and motor launches are built in the shop in up-side-down condition. Apparently, studying on building instructions in accordance with the drawings is pretty well going.

- 2) Work Schedule: Network and work schedule are prepared, but these materials do not work well. So schedule is really ready for use, and the follow up, or one of the element of schedule control, is not carried out.

- 3) Standards and Criteria: These materials are not prepared as yet. For instance, welders, while working, grip hammers with empty hands and put on rubber sandals. The above fact show that even the most fundamental step of work standard is not observed. Also painting is applied to a mast without any touch up immediately after gas cutting.

In case where no standard or criterion is prepared, it is quite common that senior worker should give special guidance to younger one.

At present no such severity is noticed.

- 4) Quality control: The ultrasonic detector test is applied to thickness check of plates, any other internal inspections are not made.

Only one is the inspection made by shipowners and surveyors from Classification Society. The X-ray inspection for butt weld joints and the die-check inspection for light part should be urgently taken in.

- 5) Technical Level: In the workshop small ships are constructed in upside-down condition and boat casits are manufactured. In order to prevent from strain or deformation, work is properly reinforced and fixed. Sufficient consideration is given to dimension accuracy in the above cases. Performance of gas cutting and welding is not good viewed from every aspect. According to the record 8 welders seem to have finished NDC training course in Bandung. However, they rendered no service to improvement of the technical level of all welders. The number of workers in the course of internal training is as follows:

Machinery: 6 (200 hr), Welding: 8 (200 hr) Total: 14

In many cases, works are actually done by senior workers, while younger workers are assistant workers or just look on the performance made by senior ones.

As far as welding is concerned, the workers specially trained in their youth could be expected to make remarkable progress in their skill. Emphasis should be laid on the above point.

1-6. Productivity

The result reported by the primary and the secondary surveys is 280 to 267 HZ/TON. PAHII shipyard may be one of the most efficient shipyards in comparison with others. The control and discipline of workers are not satisfactory, but high productivity may be due to their shipbuilding policies.

For instance, small ships like tug boats and motor launches are constructed in upside-down condition in the workshop. As to the work procedure, it is noticed that the shell plates are fixed after completing internal work. The operation efficiency as well as working environment are good.

Furthermore, the flow of materials and utilization of equipment observed in the workshop are pretty good going.

In another example of the term of new-shipbuilding work for a 1,000 MT coaster (62.8m L x 9.2m B x 4.6m H), it took nine months from keel laying to launching, and twelve months from launching to completion. Other records say that it took four months from keel laying to launching of a 5000 MT coaster (55.8m L x 9.0m B x 5.5m H), and twelve months from launching to completion, while it took five months from keel laying to launching of a 1100 MT ferry (37.5m L x 9.0m B x 2.4m H), and ten months from launching to completion. Thus even such small-sized ships sometimes require terms of work over one year. The average term of repair work in this shipyard is about two months, though it widely varies with the contents of each repair work. This is quite satisfactory.

1-7. Subcontractors

Subcontractors are occasionally employed according to the working volume, and at the time of our inspection, about 20 to 25 workers belonging to subcontractors were employed for the plating and welding work.

1-8. Design

This shipyard has three hull designers, four machine designers, one electrical designer, and one piping designer, though design drawings are said to be supplied sometimes from outside. The design section owns one unit of blue print machine, and staffed with other four draftsmen than those nine special designers mentioned above.

1-9. Material Procurement

The steel materials, welding rods, paints, pipes, etc. are locally available, though the main machines are usually imported. As for the other types of machinery, most of them relies upon import, and the long term of delivery required for imported machines is one of the problems waiting for urgent solution.

III QUESTIONNAIRE

1. General
 - 1) Layout of shipyard (appendix 1) P.T. PABRIK KAPAL INDONESIA
 - 2) Location and map (appendix 2) Jl. Ekow Runtop-Sunda Kelapa, Jakarta
 - 3) Area: Area of premises 50,677 m² (EXISTING)
Area of production "
 - 4) Annual production capacity
New shipbuilding 1500 B/T (6/7)
Shiprepairing 4000 B/T (6/7)
 - 5) Water depth: 2.5 m
 - 6) Tide: Max. 3.5 m
Min. 2.5 m Difference 1 m
 - 7) Current:
2. Yard expansion plans: Yes
Canal is too narrow, ships need 6-10 days to arrive at yard also area of production is limited, shipyard has plan remove to the entrance of the canal.
No
3. Organization and number
 - 1) Tree diagram (appendix 3)
 - 2) Number of employees for each rank
Director and manager 7 persons
Section chief and sub section chief 23 persons
Foreman and group chief 19 persons
Worker 224 persons
 - 3) Family structure of education
S.D. Elementary school (6 years) 178 persons
S.R.T.P. (S.M.P., ST ...) Secondary school (3 years) 57 persons
S.T.A. (S.M.A., S.T.A.) High school (3 years) 30 persons
ACADEMI College (3, 4 years) 4 persons
UNIVERSITY (4, 5 years) 8 persons
 - 4) Annual supply of M.A. and workers

	1971	1972	1973	1974	1975	1976
M.A.	No	"	"	"	"	"
Workers	No	"	"	"	"	"
 - 5) Overtime allowance for each hour
Working Time: Sun-Thu. 07:45-11:45, 12:15-15:45
Fri. 07:45-11:45, 12:45-15:45
Sat. Holiday
First one(1) hour: 1.5 x daytime
Over one(1) hour: 2.0 x daytime
 - 6) Ratio of annual salary up

	1976	61
	1977	101
 - 7) Welfare equipment: Bus(?) guest houses but no use now.
 - 8) Fuel supply
Lunch: Rp. 250/day
Dinner:
 - 9) Traffic expense: Yes Pay according to distance over 2 km.
 - 10) Insurance: No
 - 11) Safety for worker
 - 12) Training of worker: Especially no, train workers on the job. Workshop machine 8 person 200-R Welding 8 person 200-R
 4. Subcontractor
 - 1) Kind of skill: Chipping, painting & others
Number of workers: 53 persons
Voc:
 - 2) Degree of skill
 - 3) Number of company
 5. Tools
 - 1) Size of tool store
 - 2) Pain tools

- a) Air
- b) Electric
- c) Hydraulic
- d) Hammer, spanner, etc.

6. Productivity

- 1) New Shipbuilding
 - a) Man-hour

	Type, Kind, B/T of Typical ships	M.H Weight	Man-hour (M.H Part)	Total Man-hour
I				
II				
III				
 - b) M.H construction 230 hours/Ton
 - c) M.H construction Rp 120,000 Cost/Ton
 - d) Construction period
i)
ii)
- 2) Ship repairing
 - a) Total gross tonnage per years: 61/year
 - b) Total man-hours per years: hour/year
 - c) Total sales amount per years: \$/year
 - d) Man-hour/steel ton (in the case of steel replacement): 420 hour/Ton
 - e) Cost/M
 - f) Cost/ship
 - g) Repairing period: i)
ii)

7. Material procurement

Item	Purchase Price	Where Purchased from	Order-to-Delivery time	Stock Amount
Main Engine	Rp5,600/HP	Japan Yaman	7-8 months	
Generator				
Steel Plate	Rp185,000/Ton	Local		
Profile				
Welding Rod		Local		
Paint	Rp2,000/Ton	Local		
Pipe		Local, Import or Galvanized pipe		
Wood				

8. Design

- 1) Number of designers: Hull 4, Machine 3, Electric 1, Piping 1 size(?) in total Drafter 4
- 2) Drawing list: #1 Area 4 B M
- 3) Drawing method: • Pen
• Pencil
- 4) Photo copying machine: Blue printing machine

9. Construction techniques

- 1) Gas cutting work
- 2) Welding work
- 3) Gouging method
- 4) Fairing work
- 5) Marking work

10. Points to be noted on shipbuilding & repairing

- 1) Design: Owner's approval needs many days
- 2) Material procurement: Owner's drawing can not get approval from BKI Owner don't agree BKI request
- 3) Construction
- 4) Power shortage
- 5) Unsatisfactory quality: Still improve
- 6) Schedule behind
- 7) Inspection trouble
- 8) Others

(11) NEW SHIPBUILDING RECORDS (A-1-1) 1976

	NAME	OWNER	KIND	CLASS	D.V.T.	G.T.	CGA	B	D	ENGINE (HP)
1		PT. JER. PERK. B. NGAR PERINTIS BDT JER PERK. NGAR LAUT	Coaster	B.K.F.	500	785	55.85	9.00	5.50	600
2		P.T. PELUR	Coaster	B.K.F.	1900	762.71	61.80	9.20	6.40	1500
3		PT. ASISMA SHIPYARD		B.K.F.	400	-	32.89	8.84	2.438	-
4		P.T. JANI	Coaster	B.K.F.	950	-	59.90	11.40	6.15	1950
5		PT. BANGSA LAUTAR KEMAS	Ferry I	B.K.F.	110	180	37.50	9.00	2.40	165A
6		PT. BANGSA LAUTAR KEMAS	Ferry II	B.K.F.	110	180	37.50	9.00	2.40	165A
7		PT. ASISMA SHIPYARD		B.K.F.	200	-	23.50	7.00	2.40	-
8		BIT. JER. PERK. B. NGAR BAGAI		B.K.F.	-	-	24.59	6.80	2.00	2-140
9		BIT. JER. PERK. B. NGAR BAGAI		B.K.F.	-	-	27.00	9.00	2.50	2-52

NEW SHIPBUILDING RECORDS (A-1-2) 1976

NOY BELL STEEL NOY DT	PRICE (Rp/100)	COST	CONSTRUCTION SCHEDULE				CONSTRUCTION PERIODS				Pact. Perf.	E'ect. Perf.	Pact. Perf.	BESTIR PER- BODS	
			Comm. Date	Launch Date	Keel Laying	Stiff- ing	Full Erect.	Full Perf.	Full Perf.	Full Perf.					
1	478.210.225		18/2-75	18/3-75	18/4-75	18/5-75									
2	220.000.		3/3-75	5/4-75	30/10-75	8/11-75									
3	31.000.		12/11-75	3/5-76	21/11-75	18/11-75									
4	536.549.724		3/2-75	12/3-77	22/3-76	25/8-77									
5	350.000.		5/2-76	4/3-76	5/2-76	26/12-76									
6	21.200.		5/2-76	31/3-76	5/2-76	11/7-77									
7	80.000.		12/11-75	15/12-75	12/8-76	11/7-77									
8	20.500.		1/2-76	3/3-77	18/12-76	16/3-77									
9			3/3-76	13/2-77	18/12-76	3/3-77									

(12) SHIP REPAIRING RECORD (A-1-3) 1976

	NAME	OWNER	KIND	CLASS	D.V.T.	G.T.	Exp	B	D
1	KR. S. LAMPUR-1	PT. Bjangsar SARIL	Coaster	B.A. Onel Pantai (BA)	350	174.88	45.68	7.65	
2	KR. SELANGI BAPP	PT. Tel. Usaha Bare	"	B.A. non-ongkos Linggih BELANJANG BANGSA Pantai (BA)	80	76.29	18.10	5.50	
3	KR. KOTA SILAT-III	PT. PELUR	"	B.A./Replating (BA)	600	578	57.27	9.00	
4	KR. KOTA PUTRA	PT. Bjangsar SARIL	KR. JELAT	B.A./Repair (Steel Pantal) (BA)	300	215.24	32.07	9.72	
5	KR. SAMOGA JAYA-11	PT. Sinar Jaya	Coaster	B.A./Replating (BA)	200	173	32.50	6.80	
6	KR. KOTA SILAT-1E	PT. PELUR	"	"	400	280.84	45.25	7.60	
7	KR. SETIA RAYA	PT. Manggala Karya. CSR	"	"	34	30	19.30	4.50	
8	KR. KOTA SILAT-2	PT. PELUR	"	"	150	121	25.80	6.13	
9	KR. KOTA SILAT-IIIH	"	"	"	150	143	25.80	6.13	
10	KR. KOTA SILAT-1	"	"	"	63	66	24.86	4.50	
11	KR. MELINDA-10	PT. Sinar Jaya	"	"	180	158	34.50	5.50	
12	KR. ANDIS	BIT. Jan Parla	"	(-)	150	131.46	32.55	5.60	
13	KR. BANG-IIIH	PT. Tg. Perik	Tug	(-) (BA)	63	60	19.54	3.85	
14	KR. KOTA SILAT-III	PT. PELUR	Coaster	"	250	224	46.63	8.90	
15	KR. KOTA SILAT-11	PT. PELUR	Coaster	B.A./Replating (BA)	200	174.97	32.00	6.15	
16	KR. MELINDA-11	PT. Bjangsar SARIL	"	"	100	123	31.75	6.10	
17	KR. SELAT PAUSAR	PT. Tg. Perik	KR. Tug	"	-	123	22.42	7.50	
18	KR. KOTA PUTRA	PT. B.P.R.	Coaster	"	800	753	50.50	9.45	
19	KR. KOTA JANGKAT	PT. Pal. Kota Jangkat	"	"	250	233	42.55	7.54	
20	KR. JAYA	PT. Tel. Usaha Bana	"	B.A. Percek- saran/Syngkat- dar (BA)	150	89.81	-	-	
21	KR. KOTA CANGKAL	PT. Pal. Ka	"	B.A. repair (BA)	250	172.59	38.10	6.15	
22	KR. KOTA JAYA	PT. An. Jan Karya	"	"	170	153	34.50	5.50	

SHIP REPAIRING RECORDS (B-1-2) 1976

	SALES (M1000)			COST	REPAIRING PERIOD	PERIOD IN DOCK	MAN-HOURS		
	HULL WORK	MACHINERY	ELECTRICAL WORK				HULL WORK	MACHINERY	ELECTRICAL WORK
1		3,157,185			60	6			
2		599,669			14	13			
3		15,064,457			63	43			
4		2,457,374			61	27			
5		8,768,737			102	50			
6		2,453,471			28	22			
7		239,800			25	9			
8		9,955,600			62	42			
9		8,613,924			59	16			
10		5,579,300			43	22			
11		7,478,285			76	28			
12		23,582,455			147	141			
13		7,556,340			297	143			
14		5,815,775			22	14			
15		9,431,180			61	23			
16		2,814,569			67	29			
17		22,545,570			163	-			
18		8,255,800			32	32			
19		1,383			-	-			
20		156,581			8	2			
21		9,783,876			-	-			
22		568,200			-	-			

(13) YARD FACILITIES

1 BERTH & DOCK

NO.	NAME & TYPE	DIMENSION		MAX. SIZE OF SHIP				D.V.	D.W.D.	D USE
		L (M)	B (M)	Lpp (M)	B (M)	B (M)	d (M)			
1	Building Berth	65	65						1500	B
2	Graving Dock	70	72						750	B
3	"	70	72						750	B

* USE : Building (B), Repairing (R), Building & Repairing (B & R)

2 CRANES

#	TYPE	MAX. LIFT LOAD	MAX. ELEVATION	NO. BEAMS	NUMBER	LOCATION
1	R.C.	25 Ton			2	ASSEMBLE
2	"	15 Ton			1	ASSEMBLE
3	"	10 Ton			1	
4	B.W.C.	6 Ton			2	
5	"	0.4 Ton			1	
6	HyStar	3 Ton			3	
7	MC	3 Ton			2	STEEL STOCK YARD
8	MOIST CRANE	1 Ton		3x	2	BENDING SHOP
9	MC	3 Ton		2x	2	ASSEMBLE
10	F. C	20 Ton		5x	1	
11						
12						

Type: Portal crane (P.C.) Over Crane (O.C.), Tower Crane (T.C.)

Level Luffing crane (L.L.C.) - L = Stage Crane (S.C.) Kettle Crane (K.C.)

(3) YARD & SHOP

Shop & Shop	Total area	Area (m ²)	
		Shop area	Yard area
Shipbuilding			
Steel stock yard			
Fabrication shop			
Sub-assembly shop & yard	800		
Assembly shop & yard	3,250		

YARD & SHOP

Shop & Shop	Total area	Area (m ²)	
		Shop area	Yard area
Grand assembly yard			
Block stock yard			
Berth & Dock			
Pipe stock yard			
Machinery shop	800		

1. General Situation

1-1. Introduction

The shipyard is divided into the east site and the west site by J.L. Sinking boat. The main office building is in the east site, but all the production facilities therein are left unattended after the interruption of the construction plan of a building berth for large-sized ships in spite of the extensive area no less than 6ha. As for the west site, 2.5ha of production facilities are sparsely arranged in the precinct of 7.8ha. The shops are also sparsely laid out, and the water depth around the dock is 9 meters though it is 5 meters in the port. Here, the check of water depth is essential to those ships of the 1,000T class coming into the port, because they require at least 4 to 5 meters of water depth.

The largest ship built in this shipyard so far is a cargo of 9502T, and as of October, 1977, its completion is still kept pending since the main machines to be supplied from the shipowner have not arrived yet.

There is no fixed storing area for steel materials, and some of them are piled up even on the road, probably because of the abundance of space in this shipyard. The parking yard, cutting yard, sub-assembly yard, and assembly yard are effectively laid out according to the flow of production lines.

The repair work facilities are one unit each capacity of 2,500 lifting-ton, and 1,500 lifting-ton floating-dock, and the annual repairing turn-out recorded so far is 16,000 GT. Each floating-dock is moored away from the land.

The jetty which is about 200 meters in length is being used as a connection pathway and it seems impossible to carry heavy goods on it. Heavy cargoes will have to rely on the floating crane or to be lifted from large or other type of transportation vessel to dock. They are planning to construct a dry dock here in the near future, and when completed, the efficiency of repairing work will drastically be improved because this dry dock is expected to come closer to land.

1-2. Conditions of Location

This shipyard abutting on the port is endowed with the optimum locational condition for the import of ships to be repaired into the shipyard, the accommodation of crews for the repairing period, the procurement and arrangement of necessary materials for the repair, etc. though the maintenance of the water depth requires special attention. The spacious area seems to promise a bright future.

1-3. Shop Facilities

Both shop facilities for the re-shipbuilding and the repairing work are deliberately laid out, and high productive efficiency and capacity are expected especially in the future expansion.

For the time being, the condition of the storing area for steel materials and the dealing of steel materials are two major problems requiring urgent amelioration as a shipyard originally designed for re-shipbuilding.

1-4. Organization and Employees

This shipyard has a total of 550 employees, and 410 of them are working in the production fields, and 140 in other non-productive departments. Of these 550 employees, 342 workers have academic careers in high schools or much higher education. Thus the educational level of this shipyard employees is relatively high.

1-5. Production Management and Production Technique

All the job cutting and selling work in this shipyard relies on the hands of employees, and the technical level of their manual work is average. The shipyard is stressing the technical improvement of the staffs and workers, and annually sending about five employees to advanced shipbuilding countries like Norway and Japan for technical training so that they can acquire enough engineering skills for the future positions to lead the ordinary workers. The shipyard is also sending many workers to the in-house training center for their technical improvement, while daily training the employees in the practical spot work within the shipyard. Bringing up of skilled workers is one of the urgent needs for this shipyard, though 115 of the total direct workers have already had experiences over five years.

The effective production management is also very important as a shipyard mainly engaged in re-shipbuilding work, and rearrangement of the storing area for steel materials and of the surface treatment of steel materials is most desirable. As for the re-shipbuilding work itself, some divisions are left conspicuously unattended. So suitable production and management control of the material procurement schedule and the labour allocation schedule for the contracted delivery, the turn of work, and the situation of the whole production process at work is essential, though to admit that effective allocation of workers is one of the most difficult parts in production management.

1-6. Production Efficiency and Turn of Work

This shipyard built four ships in the year 1971, five in 1972, six in 1973, another six in 1974, and two in 1975, 1976, and 1977 respectively. Thus the re-shipbuilding turn-out this shipyard recorded in these seven years is quite substantial.

According to the records, the cargo/passenger ship of 7502T built here in 1975 took a turn of work of 22 months, and the total man-hours required per net proceeds tonnage are 4008. The 9502T cargo/passenger ship, on the other hand, has been still moored at the outfitting quay waiting for the arrival of the main machines to be supplied from the shipowner even 22 months after the keel laying in December, 1975. They say that it was in October, 1977, that this cargo/passenger ship was transferred to the present quay.

The annual turn-out of the repairing work is 16,000 GT, and the man-hours per construction tonnage of steel materials required for the repair are 4208. Compared with the other shipyards, these man-hours per tonnage are a little too high.

1-7. Design

The design section of this shipyard has 13

staffs working under the supervision of section Chief, and owns one unit of photo copying machine. All the necessary drawings are being drafted here domestically. The drawings of the two cargo/passenger ships of 7500/T and 9500/T mentioned above are said to have been supplied from the respective shippers.

1-8. Material Procurement

Both main and auxiliary machines imported generally take three to six months to procure, and have been one of main causes of delay in production work. All the other materials required are being locally procured, and have caused no fatal delay in production so far.

2. Problems

2-1. As already stated, this shipyard has enough space for both newshipbuilding and repair work, and all the ships are spaciously laid out. Considering the plan of new dry dock construction, the future expansion of business showings is quite expective.

2-2. This shipyard especially requires careful managerial control of the production process, because it is laying much weight on newshipbuilding. For instance, the outfitting work of the above-mentioned cargo/passenger ship of 9500/T has been suspended for such a long period simply on account of the delay in supply of the main machinery from the shipowner. This kind of managerial trouble should have been avoided if the previous negotiation had carefully been proceed.

III QUESTIONNAIRE

Indices for English/
Japanese in the questionnaire
(Code No.) (Contents of Answer)

1. General

- 1) Layout of shipyard (Appendix 1) P.V. Pellen Bahard
- 2) Location and map (Appendix 2) M. Sizing Ltd. Ig. Fricke, Jakarta
- 3) Area:

	West site	East site
Area of premises	2.8 ha	65 ha
Area of production	2.5 ha	船塀等のみ
- 4) Annual production capacity

New shipbuilding	950 0/W (6/7)
Shiprepairing	16,000 0/W (6/7)
- 5) Water depth: 港内 5 m • Floating Dock 長さ 30 m
- 6) Tide: 1.0 m
- 7) Current: 港内につく影響なし

1-3) You standing there is only the office building.
-5) 5m in the port, and 9m around the floating dock.
-7) Current is ignorable because the shipyard is located within the port.

2. Yard expansion plan: (X)

No

3. Organization and number

- 1) Tree diagram (Appendix 3)
- 2) Number of employees for each rank

Director and manager	550 persons in all
Section chief and sub section chief	— persons
Foreman and group chief	— persons
Worker	— persons

3) Ranking structure of education

S.B.	Elementary school (6 years)	205 persons
S.A.T.P. (S.A.B., ST ...)	Secondary school (3 years)	164 persons
S.A.T.A. (S.A.B., S.V.M.)	High school (3 years)	138 persons
ANACARDI	College (4, 4 years)	7 persons
UNIVERSITY	(4, 5 years)	5 persons

4) Annual supply of B.A. and workers

B.A.	1971	1972	1973	1974	1975	1976
Workers	Workerの社外雇用入替っている。					

3-4) The annual percentage of retiring and recruited workers to the whole employees is about 2%.

5) Overtime allowance for each hour

	Week day	Sunday & Holiday
毎日の1時間	1.5倍	2倍
2時間以上	2倍	2.5~3倍

-5) First one hour 1.5 times 2 times
Second hour onward 2 times 2.5 to 3 times
-6) To be increased in proportion to the price index of the year.

6) Ratio of annual salary up

定額昇給に拠った昇給率としている。
最低 約 10,000/month

Minimum ratios: Rp. 10,000/month
-7) 1. Houses to be lent to section chiefs and senior staffs ranking higher than them.
2. The shipyard owns a private tennis court.
3. The employees have a golf club. (For directors and the other staffs ranking higher than them, 75% of the expenses is covered by the company.)
4. The company has a special agreement with a certain hospital, and also has a private doctor.

7) Welfare equipment

- 1. 部長以上の住宅貸与 2. クラス—11直営 3. プラザ/娯楽施設 4. 社会施設あり、他無し

8) Meal supply

Lunch: 支給、従業員人当り 1月10kgのrice支給
Dinner: -

9) Traffic expense

- 1. 実費支給 約 100~300/
- 2. 仮借以上 実費負担費用を会社から支給

-8) Supplied from the company. (10kg of rice is being supplied to every member of the employees' families per month free of charge.)

10) Insurance

1973年から火災損害の契約を予定

-9) 1. the actual traffic expenses are supplied from the company. (Rp. 100~300/month)
2. Executive staffs can loan money for purchasing a car from the company.

11) Safety for worker

労働者の安全規則を守っている。

-10) A fraternal insurance system is scheduled to be introduced in the year 1978.

12) Training of worker

- 1 年間に最低半以上の従業員 5人をtrainingに派遣を予定している。
Norway, Japan or 他者の training center に派遣の費用あり。
派遣において、仕事をしながら徐々に従業員を訓練している。

-11) Subject to the safety regulations issued by the Ministry of Labour.

4. Subcontractor

- 1) Kind of skill: machine fitting, fr. cleaning, painting, welding
- Number of workers: 50人~100人/日
- Wage: 従業員比

- 2) Degree of skill: 熟練を必要と人を選んでいる。

- 3) Number of company: 2~3社

-12) It is scheduled to send abroad five employees graduated from high schools or with higher academic careers annually for technical training. Many employees have been sent to Norway, Japan, and local training centers so far. Training of employees at the actual spot of work is also being promoted quite positively.
50~100 workers/day
Paid on piece-rate basis.

5. Tools

- 1) Size of tool store: 25 m x 60 m

2) Pa'n tools

- a) Air: 1台
- b) Electric: 2台

-2) Only those workers with enough skills are selectively employed.

-3) At present, two or three companies are working as subcontractors.

- c) Hydraulic Jack
- d) Pinner, spinner, etc.

6. Productivity

1) New Shipbuilding

a) Pan-hour

	Type, Kind, #/# of Typical Ships	Full Weight	Pan-hours (Full Part)	Total Pan-hour
I	Cargo/Passenger 750 GT	450	Apron. 185,000	360,000
II				
III				

- b) Full construction 400 hours/ton
- c) Full construction - cost/ton

d) Construction period

- i) 750 GT Cargo/Passenger 22 months
- ii)

e) Construction cost in case 750 GT Cargo/Passenger

Material cost	Rp. 405,359,000	63%
Wage & charge	Rp. 132,545,000	21%
Others	Rp. 100,619,000	16%
Total	Rp. 638,523,000	100%

2) Ship repairing

- a) Total gross tonnage per year: 16,000 GT/year
- b) Total man-hours per year: 284,200 hr./year
- c) Total sales amount per year: Rp. 584,012,000 /year
- d) Pan-hour/steel ton (in the case of steel replacement): 420 hr/ton
- e) Rp. 36,500 Sales/GT
- f) Rp. 15,784,000 Sales/ship
- g) Repairing period i) Annual survey 10-15 days
ii) Special survey 53-78 days

7. Material procurement

Item	Purchase	Where purchased from	Order-to-Delivery time	Stock Amount
Main Engine	100,000/75	Import	6 months	
Generator	125,000/75	"	"	
Steel Plate	1250/75	(Local)	受取要所期	3 months
Profile	200/75	"	"	"
Welding Rod	400/75	"	"	"
Paint	2200/75	Local	"	"
Pipe	350/75	"	"	"
Wood	Teak 300,000/75 Soft 35,000/75	"	"	"

8. Design

- 1) Number of Designers 43人
- 2) Drawing list 船体及装置設計すべて開業する。Cargo/passengerの船体は船主委託設計。
- 3) Drawing method = Pan
= pencil
- 4) Photo copying machine 1台

9. Construction Technics

- 1) Gas cutting work acetylen gas cutting
切断機は手動を使用している。船体に依りて grinder 使用される。
- 2) Welding work
鉄板手動溶接
- 3) Grinding method
Chipping 主行、CAB。
- 4) Polishing work
仕上げ手動
- 5) Painting work

10. Points to be noted on shipbuilding & repairing

- 1) Design -
- 2) Material procurement -
- 3) Construction -
- 4) Power shortage -
- 5) Unsatisfactory quality
増える。改善作業の向上を促している。
- 6) Schedule behind
船体の入庫が遅れ、船体の工事を stop している。
- 7) Inspection trouble -
- 8) Others -

船体建造	Ship repair
Sea shipbuilding	ship repair
契約期 20%	20% - after 25% work
Keel laying 20%	40% - after 20% work
Launching 20%	30% - finishing work
Delivery 20%	10% - 受取し後 3ヶ月
受取し後 6ヶ月	10% 船主、船主委託の費用 6~12ヶ月

Immediate delivery after payment
All the necessary drawings are drafted domestically.
(The drawings of cargo/passenger ships, however, have been supplied from the respective shipowners.)

b-2)

9-3)

-2)

-3)

-4)

10-3)

10-5)

Heat cut surface inspected wire stretched, and seemed to require grinding.
The technical level is average.
Mainly by chipping.
Finish is quite satisfactory.
Occasionally observed. (They are now planning to improve the technical level.)
There is a new ship whose building work is suspended by delay in parts procurement.

Terms of Payment

	Sea shipbuilding	Ship repair
At the time of:		
Contract	20%	20% - after 25% work
Keel laying	20%	40% - after 20% work
Launching	20%	30% - finishing work
Delivery	20%	10% - three months after delivery (in the case of ships belonging to the government or the other official organizations, 6 to 12 months after delivery)
Six month after delivery	10%	

(11) NEW SHIPBUILDING RECORDS (A-1-1) 1976

	NAME	OWNER	KIND	CLASS	D.W.T.	G.T.	Length	B	D	ENGINE
1			Tug Boat		-	-	10.3	3.3	1.6	2x52HP

(12) SHIP REPAIRING RECORDS (B-1-1) 1976

	NAME	OWNER	KIND	CLASS	D.W.T.	G.T.	Length	B	D
1	R.R. Gundaling	P.T. Raskita	Cargo	B.R.I.	750	530	50.0	9.3	1.0
2	R.R. Karabata	P3 Bisjanta	"	Ind. Govern	553	569	50.3	10.0	3.7
3	RPL Patirantax	Pengerukan	Bredging	B.R.I.	-	1236	20.9	12.6	
4	Bak Lumpur B-11	"	Barge	Ind. Govern	-	-	23.0	5.7	1.75
5	Bak Lumpur B-12	"	"	"	"	"	"	"	"
6	R.C. Parlon	"	Bredging	"	-	154	22.5	11.0	1.8
7	RSP Brantas	B.P.P.	"	Indonesia	-	-	18.3	6.12	0.0
8	R.R. Karabata	P.T. Karabata	Cargo	B.R.I.	1000	750	51.1	11.1	3.65
9	R.R. Karabata	P.T. Patel	"	"	537	437	60.6	10.5	3.1
10	R.R. Koroed Mononite	P.P.S.S.	"	B.R.I./G.T.	1063	816	55.0	9.7	5.3
11	R.R. Setajar	P.V. Bahari	"	B.R.I.	1300	1243	67.0	11.0	0.0
12	R.R. Valasidhi	BISMAL	Hydrograph	NAVY	722	-	53.5	9.5	3.5
13	R.R. Pajangan	P.T. Patel	Cargo	B.R.I.	350	545	50.0	9.3	3.7

SHIP REPAIRING RECORDS (B-2-1) 1976

	NAME	OWNER	KIND	CLASS	D.W.T.	G.T.	Length	B	D
14	T.M.A. 9	Pengerukan	Barge	B.R.V.	-	85.59	20.0	6.0	1.5
15	T.M.A. 11	"	"	"	-	90	21.7	6.0	1.7
16	R.R. PIRABAYA 17	P.T. Rindhartika	"	"	229	190	22.0	6.50	3.0
17	R.R. Riaraya 18	"	"	"	"	"	"	"	"
18	R.R. Riaraya 20	"	"	"	"	"	"	"	"
19	R.R. Seputes W	Australia Bredging	Bredging	B.V.	2632	1737	72.8	13.0	11.5
20	R.R. Pakasa 52	Sarata	Cargo	B.R.I.	1000	-	61.0	9.16	1.0
21	RRI Bembang	ALASA B.V.	Warship	NAVY	150	-	42.0	7.0	2.7
22	RRI Arca	"	"	"	138	-	42.0	7.0	1.5
23	R.R. Adiguna Paraga	Bahera Adiguna	Cargo	B.R.V.	1661	1035	62.9	10.0	5.6
24	R.R. Riga 17	R.P.V.	"	"	1051	-	61.0	9.7	3.5
25	Kapat Cess I	Fa. Sentral	"	"	50	-	19.5	4.7	2.3
26	Kapat Cess II	"	"	"	"	"	"	"	"
27	T.B. Parfina I	P.V. Arata	Tug Boat	ASB	200	-	-	-	-

SHIP REPAIRING RECORDS (B-3-1) 1976

	NAME	OWNER	KIND	CLASS	D.W.T.	G.T.	Length	B	D
28	R.R. Lakota	P.T. Patel	Cargo	B.R.I.	575	522	51.0	9.0	3.7
29	R.R. Karabata	P3 Bisjanta	"	Ind. Govern	-	563	50.5	10.0	1.0
30	R.R. Tantiabar	P.V. Bahari	"	B.R.I.	1221	122	67.0	11.0	5.0
31	R.R. Selat Pakasar	P.T. Patel	"	B.R.I.	1453	1058	60.0	12.0	4.7
32	RSP Sokahul	Pembangunan Barat	Ferry	"	-	600	30.9	11.3	3.7
33	R.R. Karara	Sarata	Cargo	"	2358	1638	77.5	12.0	6.0
34	RRI Parina	ALASA B.V.	Warship	NAVY	158	-	42.5	7.0	3.57
35	RRI Karajasad	Hydro Oceanografi	Hydro-graphy	Hydro-graphy	1300	-	78.0	11.1	3.1
36	R.T. Mirabana	Tallaba Limber	Cargo	B.R.I.	-	160	42.5	6.5	3.5
37	R.R. Berifan	Perintis	"	"	500	653	58.1	9.7	2.15

(13) YARD FACILITIES

1 BERTH & DOCK

NO.	NAME & TYPE	DIMENSION		MAX. SIZE OF SHIP				G.T.	D.W.T.	USE
		L (M)	B (M)	Opp (M)	B (M)	D (M)	d (M)			
1	Building Berth	120.0	18.0						1900	B
2	Building Berth	277.0	32.0						55000	B
3	Floating dock	67.0	28.4						TLC 2500	R
4	Floating dock	109.0	19.5						TLC 1500	R

USE : Building (B), Repairing (R), Building & Repairing (B & R)

2 CRANES

	TYPE	MAX. LIFT LOAD	MAX. ELEVATION	MAX. REACH	NUMBER	LOCATION
1	A.C.	15 T			1	
2	D.W.C.	5 T			2	
3	T.C.	15 T			1	
4	T.C.	5 T			1	
5	T.C.	3 T			2	
6	P.C.	10 T			1	
7	P.C.	15 T			1	
8	Fork-lift	3 T			3	

Type: Portal crane (P.C.) Over crane (D.W.C.), Tower Crane (T.C.)

Level Luffing crane (L.L.C.) = L = Shape crane (S.C.) Mobile Crane (M.C.)

(3) YARD & SHOP

Stage & Shop	Area (sq')		
	Total area	Shop area	Yard area
Shipyarding			
Steel stock yard			
Fabrication shop			
Sub-assembly shop & yard			
Assembly shop & yard			
Final assembly yard			
Block stock yard			
Berth & Dock			
Pipe shop	500		
Pipe stock yard			
Painting shop	1200		
Carpenter shop	500		
Plater shop	500		
Electrical shop	220		
Welding shop			
Refitting shop			
Iron & Casting shop	25		
Warehouse	1200		
Welding shop	500		
Rail life	650		
Braving room	300		
Refitting			
Berth & Dock			
Kill shop			
Refinery shop			
Outdoors working area			
Stockyard			
Warehouse			
Refract			

(4) MACHINERY & EQUIPMENT

	TYPE CAPACITY	LOCATION	NUMBER
01			
1	Sand Blasting 2kg/cm ² 137%	Plater Shop	1
2	Bending Roll 2x/2x	"	1
3	Profile bending machine 50 ton	"	1
4	Plate Shear 7.5x/2x 1502	"	2
5	Rolling press 200 ton	"	1
6	Pneumatic chipping chisel 1kg/cm ² 157%	"	4
7	Drilling Machine 10.17y	"	1
8	Punching Machine 25x/2y 1502	"	1
9	Grinding Machine 2x/2y	"	1
10	Welding transformer 350-400 Amp. 137%	Welding Shop	120
11	Welding floor 30x2	"	1
12	Acety line generator 18.07-113/cm ² 137%	"	2
13	Automatic Cutting Torch	"	5
14	Cutting torch	"	22
15	Cutting floor 30x2	"	1
16	Gravely welding 300-500 Amp. 137%	"	4
17	Working table 2x/2	Pipe Shop	1
18	Burner	"	5
19	Pack saw 30x/2x 1502	"	1
20	Pipe bending hydraulic 50-130x/2x 137%	"	1
21	" 25-50x/2x 137%	"	1
22	" 15-50x/2x 137%	"	1
23	Thread cutting hand 137%	"	2
24	Lathe 500x1500x/2x 137%	Refinery Shop	1
25	" 500x1500x/2x 137%	"	1
26	" 800x1250x/2x 137%	"	1
27	" 550x2000x/2x 1362	"	1
28	" 350x1250x/2x 1362	"	1
29	" 125x1300x/2x 1361	"	1
30	Radial Drilling Machine 50x/2x 1361	"	2
31	" 75x/2x 1361	"	1
32	Horizontal Drilling Machine 750x350x/2x 1362	"	1
33	Table Planer 250x650x/2x 137%	"	1
34	" 200x500x/2x 1362	"	1

MACHINERY & EQUIPMENT

NO.	TYPE	LOCATION	NUMBER
35	Rock Saw	1962 Machinery Shop	2
36	Convey Crane 10 ton	"	1
37	" 15 ton	"	2
38	Circular saw 600mm	1962 Carpenter Shop	2
39	Saw mill	1962 "	2
40	Band saw 300kg	1964 "	2
41	Flaming machine 50cm wide	1962 "	2
42	Castiron melting furnace 0.5 ton	" Iron & Casting Shop	1
43	Non ferrous melting furnace 0.25 ton	"	1
44	" 0.10 ton	"	1
45	" 0.08 ton	"	1
46	" 0.04 ton	"	1
47	Coil winding machine 5kg/min.	1970 Electrical Shop	1
48	Furnace 2kg	1969 "	1
49	Cake 350x250x2m	1972 "	1
50	Drilling (manual) 30cm-d	1961 "	1
51	Battery charger 30V/100A	1972 "	1
52	Blower fan 1200/7m	1965 "	1
53	Tower Crane 15 ton	"	10
54	Reverner AC/DC-350/220V 3kw	1969 "	1
55	Grinding machine 3kw	1967 "	1
56	Press grinding hydraulic 130w/7m	1962 "	1
57	Braking floor 3000x16000m	Rock & Soil	1
58	Braking board (table) 1500x1900m	Braking/Testing room	1
59	" 1500x930m	"	1
60	" 1300x1200m	"	2
61	" 2500x1250m	"	1
62	" 3000x1600m	"	1
63	Braking printing machine (blue print) Revere	"	1
64	Calculator International R-128	"	1
65	" Casio FX-101	"	1
66	" Cortex - 55	"	1
67	Flanmeter	"	1
68	Integrator	"	1

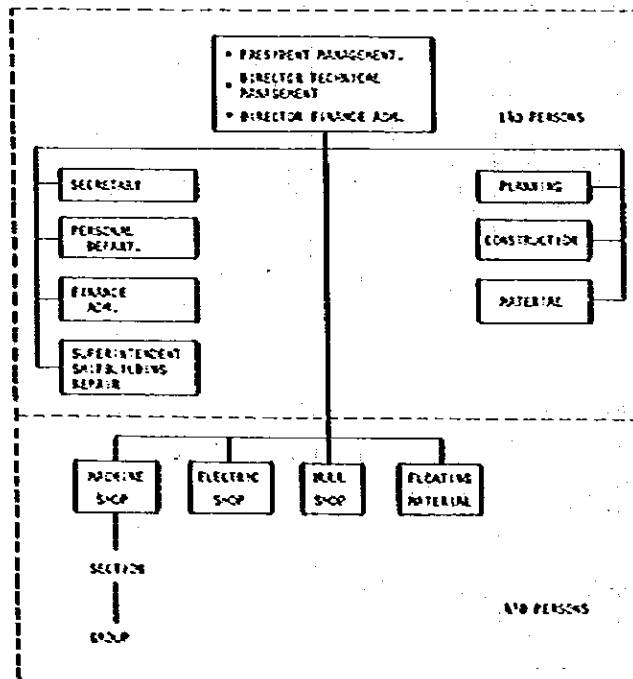
(5) Utilities

Items	Capacity
Electric Power	0000000
Drinking & Industrial Water Facilities	Well 1000000000
Compressed Air Facilities	_____
Acetylene & Oxygen Facilities	Oxygen 0000000
Water pollution Control Facilities	_____
Others	_____

13-(5)- "Electric Power" etc. as forth
 Supply solely from the private power plant of their own.
 (Water volume of the capacity is sufficient.)
 Equipped with oxygen generating facilities.

ORGANIZATION P.T. PELITA BARRI

APPENDIX I



VII. P.T. DOCK DAN PANGRANAN "JANUARY 1964"

1. General Situation

1-1. Introduction

This is a shipyard established in 1850 still under Dutch rule mainly for ship repairing.

This DOCK ISIKO is located in the port, and has a spacious area of 27,025. The production area amounts to 18,525, and little space is left unoccupied. The shipyard is divided into two blocks by a canal, and the mutual managerial communication between these two blocks is inconvenient and inefficient. So they are now planning to rearrange the facilities lay-out for better productivity and managerial efficiency.

The area leaves no room for further expansion because the shipyard is butting on the port which belongs to the state. The water depth around this shipyard is 4 to 9 meters, and often prove insufficient for large-sized ships coming in the dock. So periodical as well as occasional sounding is essential for safe mooring or transposition of them.

The inside of the dockyard, however, is neatly arranged and controlled, and suggests that rationalization has been promoted to a possible degree.

The management policy is suitably established for their method in which the main business of ship repairing work is concurrently promoted with the work of hull assembly, outfitting or large building in order to maintain the engineering technique necessary for shipbuilding. In principle, they regard shipbuilding as less profitable than ship repairing because it requires a large amount of operating cost for material procurement, personnel expenses, etc. in addition to long wasteful time required for import material procurement causing suspension of work which results in increase of expenses and working rates to burden, in spite of the retardative collection of bills to credit.

They are making efforts to improve the production quality by replacing old-fashioned shop machines with the latest ones as occasion calls. For welding, they have acquired high technical potential by employing automatic welding machines, and for gas cutting, they have adopted combined use of L.P.G. from a viewpoint of cost reduction. Thus the spirit of high quality at low cost runs through their management policy.

1-2. Conditions of Location

This shipyard is located on the port and the present area is fast land. So there is no room for future expansion. For the time being, they are planning to improve the production flow by rearrangement of the shop facilities and repairing the canal.

Situated in the capital city of Jakarta, the shipyard enjoys the optimum positional advantage for securing repair orders and material procurement.

1-3. Shop Facilities

See ship facilities of this shipyard are likewise reflecting its long history. As for the slipway and the dry dock, the rationalization of the facilities is steadily being promoted in parallel with the careful and reduced operation of the superannuated facilities.

This shipyard, on the other hand, has the long-

est outfitting shop in Indonesia. Compared with the other local shipbuilding yards poorly equipped with outfitting shops, this shipyard has unfathomed operation potential of outfitting work.

1-4. Organization and Employees

This shipyard has a total employees of 1263 except general director, and 938 of them are skilled workers with over five years' experience. This indicates a high percentage of the settled workers. Of the total employees, only 173 workers have academic careers in high schools or higher educational institutes. This percentage of educated workers seems relatively low.

1-5. Production Management and Production Technique

The inside of the shipyard is neatly arranged and the working environment is maintained quite satisfactorily. As already mentioned, this shipyard is mainly engaged in not shipbuilding but ship repair work. So excellent managerial ability is required for the operation system to concurrently promote the docking and mending repair work of many ships and to deliver them within the contracted terms. All the managerial programs are carried out in accordance with the master schedule, fully schedule, and material distribution plan. However, one of the ships in their yard is said to have been moored for no less than six months only for the reason that it requires certain import repair parts and their delivery is still uncertain.

As for gas cutting work, they employ one unit of semi-automatic gas cutting machine, and use L.P.G. gas in parallel with acetylene gas because L.P.G. is not so inferior to acetylene in practical cutting quality and the cost is relatively low. Use of L.P.G. gas, however, is limited to open space, and no L.P.G. is used in closed working places. The nominal oxygen purity specified by the maker is 95%, but actually, it amounts as low as 85 to 90%. The cut sections, therefore, are streaked and the cutting speed is low. Finish of the cut surfaces generally relies on chipping, and grinding finish is applied only as occasion demands.

As for welding, they employ four units of automatic welding machine, and maintain high quality and efficiency in thick plate work.

As for inspection of welding quality, they use ultrasonic wave magnetic flaw detectors instead of X-ray detectors.

The gauging work is carried out by chipping or electrode gauging.

As for marking, the jointed plates are directly marked in chalk according to the actual pattern laid over them since great part of their work is repair work. In case the repairing part is a plate, there is no need of marking because the plate is cut out according to the repairing part.

The regular weekly work hours of the employees are 42. Extra wages for overtime work are added to their base wages up to seven hours beyond the regular work time. In the other cases, allowances for overtime work are specially calculated.

1-6. Production Efficiency and Term of Work

The man-hours per tonnage of steel material consumption in repair work are 3780. In Indonesia this value is near to average.

The average term of repair work recorded in the second semester of the year 1977 is 33 days for A.S.¹ and 163 days for S.S.² In the case of S.S., the term of repair work is prolonged mainly by long delivery terms of required repair parts.

1-7. Material Procurement

All the materials are obtainable through the local distributors in Jakarta, but 90 to 95% of them are imported materials whose term of delivery is quite long.

These imported materials take much time to procure them for their complicated import procedure, and the long terms of delivery often defy effective material distribution schedule and destroy the original production plan.

On the other hand, the quality of materials practically procurable is sometimes too low.

(1) Oxygen : The actual purity of oxygen locally supplied is as low as 94 or so in spite of the nominal purity of 98%. This naturally causes bad working efficiency.

(2) Paints : The contents of some paints are different from those indicated on the label, and the contained volume falls short of the net weight specified.

*A.S. : Annual Survey
S.S. : Special Survey

- (3) Cement : In some cases, a 40kg sack contains only 25kg.
(4) Steel plates : The quality widely varies.
(5) Zinc plates : The quality is very bad even supplied from the shipowner.

2. Problems

2-1. In spite of the limited area, they are positively proceeding rationalization of the production process, improvement of productive efficiency, introduction of the latest engineering technique, and other plans of modernization.

2-2. The inside of the backyard is neatly arranged, and the shops are well-lighted and filled with active mood.

III QUESTIONNAIRE

Referential indices for English translated from Japanese partially in questionnaire

1. General
 - 1) Layout of shipyard (appendix 1) P.V. dock das perkapalan "tanjung priok"
 - 2) Location and map (appendix 2) Jl. Pura-bangas Palabuhan 1, Tanjung Priok, Jakarta
 - 3) Area: Area of premises 21.0 ha
Area of production 18.5 ha
 - 4) Annual production capacity
New shipbuilding 3,000 B/W (6/7)
Shiprepairing 313,000 B/W (6/7)
 - 5) Water depth: 4-5 m Floating Dock 用器の修理を待つための dredging の必要がある。
 - 6) Tides: 2.0 m
 - 7) Current: 港内の北を流しどなし

(Code No.)

(Contents of answers)

2. Yard expansion plan: Yes
No

(15)

bridging is required to maintain the water depth around the floating dock.

(7)

Current is ignorable because the yard is in the port.

3. Organization and number
 - 1) Tree diagram (appendix 3)
 - 2) Number of employees for each rank 1259 persons in all
Director and manager _____ persons
Section chief and s.a. section chief _____ persons
Foreman and group chief _____ persons
Worker _____ persons
 - 3) Paring structure of education
S.O. Elementary school (6 years) } 1030 persons
S.E.T.A. (S.M.O., ST ...) Secondary school (3 years)
S.E.T.A. (S.M.L., S.T.M.) High school (3 years) 151 persons
ADDCU College (3, 4 years) 11 persons
UNIVERSITY (4, 5 years) 10 persons

3-4)-3.A.*

They have a plan to employ 7 car engineers, but is difficult due to excessive deficiency of qualified applicants.

"Worker"

They are planning to employ 30 new workers and this recruiting seems quite easy, but it is rather difficult to find special workers like divers.

- 4) Annual supply of S.L. and workers
1971 1972 1973 1974 1975 1976
S.L. 労働者が少ないため採用は困難である。 engineer は 7 人採用したい。
Workers 採用は容易である。 diver のように特殊な採用が難しい。 30 名程度

(5)

The legal weekly work hours are 40 H, but the regular work hours of this yard is 42 H, a week. Therefore, the extra wages for those 2 hours are added to the base wages. These extra wages include expenses of lunch payable by the company, equivalent to 5 X 0.5 M's pay. 7.50 to 16.00 100% (base wage)
16.50 to 18.00 150%
18.00 to next 6.00 200% X 0.8

- 5) Overtime allowance for each hour
通常では 1 時間 2 倍と定められているが、当社は 1.5 倍の賃金として支払っている。 2 時間以上の超過分は賃金で支払っている。この超過分の賃金には労務費換算金として 5 X 0.5 M の加算金を含んでいる。
7.50 - 16.00 100% (基本賃金)
16.50 - 18.00 150%
18.00 - 翌朝 6.00 200% X 0.8

(6)

Increased by 15% in 1976, including the annual base up portion.

- 6) Ratio of annual salary up
15% の増加は定額と給与の 5% up である。

(7)

The company has a Mountain Hut, but no Hospital. It seems no gratification, and employees usually go to the municipal system. Fraternal loan system
All the employees can use this system, and they monthly pay the membership fee of Rp.200. The company gives 25% subsidy to this system and the money is loaned to each employee free of interest.

- 7) Welfare equipment
バス屋あり、病院なし。遺棄者は育児費が支給されるので苦言してない。
貸し出し車庫あり。
会費は全従業員とし、会費で 3 月 7, 200 を支払う。会社が 25% 還元を保障しランニングの個人費に貸し、貸し金庫なし。

(8)-"Lunch"

Expenses are paid as a part of wages and there is no actual service for lunch

"Dinner"

Served for overtime work after 18.00

- 8) Real supply
Lunch: 従業員に食費として支給し、差入はない。
Dinner: 18.00 以後の over time に支給。
- 9) Traffic expense
Jakarta 市内からの通勤費のみ従業員支給。

(9)

Actual communication expenses to and from Jakarta are supplied.

- 10) Insurance
失業手当の補給は全額会社が負担する。

(10)

In the case of worker's accident, all the medical and other expenses are covered by the company.

- 11) Safety for worker
労働者の安全規則を守っている。安全委員会あり。

3-11)

Subject to the safety regulations issued by the Ministry of Labour. Has a safety committee.

- 12) Training of worker
以前、15 名の training を行ったところ、技術を身につけるとして人を採用して別の高い労働をした。現在も毎月 10 名程度を養成しているが、他社に勝る点では training cost が高い。
また、政府の奨励を受けて training をしている。Governmental training の奨励を受ける。

(12)

All the workers trained in this yard had left the company and found higher wages positions in other enterprises, mostly financed by foreign capital, except only 4 workers, these workers who had left are skilled technicians being acquired good enough technique on light, so, self-training of workers in a private enterprise does not usually pay, and result in encouraging them to work in other companies. This yard is now proceeding open training through actual work, and requesting a governmental training system.

4. Subcontractor
 - 1) Kind of skill: Th. cleaning, fitting of engine, electrical fitting
Number of workers: 250 250 A/B
Wage: 労賃の増減及び数により異なる。
 - 2) Degree of skill
人を適当に選ぶ。
 - 3) Number of company
5) 無とりが、新機が壊れたら関係なく、人を雇って作業をこなす。

4-11)-"No. of Workers"

200 to 250 workers/day

"Wages"

Varies with the type and value of work

(2)

proper selection of workers is essential

(3)

At present, 50 companies are subcontractors, and work is allocated to suitable workers respectively of their belonging.

5. Tools

1) Size of tool store

工具倉庫は充分

2) Main tools

- a) Air Hammer, drill
- b) Electric drill
- c) Hydraulic Jack
- d) Hammer, Spinner, etc.

作業の進展に十分間に合う数の道具はあり

5-1)

There is a large tool machine

-2)-d)

There is a enough number of tools for the present work volume

6. Productivity

1) New Shipbuilding Training のため Barge を建造中

a) Pan-bour 新造船の資材は殆ど不足ない。

	Type, Size, #/W of Typical Ships	Roll Weight	Pan-bour (Roll Part)	Total Pan-bour
I	-	-	-	-
II	-	-	-	-
III	-	-	-	-

b) Roll construction hours/ton

c) Roll construction cost/ton

d) Construction period

- a) -
- b) -

2) Ship repairing

- a) Total gross tonnage per year: 313,213 GT/year
- b) Total man-hours per year: 2,006,132 hour/year
- c) Total sales amount per year: Rp. 4,154,576,000 /year
- d) Pan-bour/steel ton (in the case of steel replacement): 378 hour/ton
- e) Rp. 13,360 sa/ton
- f) - sa/ton/ship

g) Repairing period U.S. S.S.
I) 約 33 days 163 days

II) U.S. 船員費額 263 days (船員入替り待ちのため)

6-1)

A barge is under building to train the workers.

-2)-a)

The actual turn-out of new shipbuilding is quite minor

-2)-g)-1)

Average

-11)

Longest term ever recorded (U.S.): 263 days - suspended by the delayed delivery of the required repair parts

7. Material procurement

Item	Purchase Price	Where Purchased from	Order-to-Delivery time	Stock Account
Generator		Import through agent	3 - 4 months	-
Steel Plate	Rp 145-185/kg	Local market import	3 - 4 days 3 - 4 months	1500 t
Profile	Rp 75-200/kg	Local market import	3 - 4 days 3 - 4 months	lot
Welding Rod	BB 26 Rp 325/kg BB 68 Rp 345-500/kg	Local market	Direct	lot
Paint	Ac Rp 1200-1300/AF AF 1200-1250 Bc 1200-1500 Fc 2000-2700	Local market	Direct	3000
Pipe	1 1/2" 335-342/m 3/4" 165-534 1" 720-831 1 1/4" 525-1155 1 1/2" 1055-1320 2" 1475-1280 2 1/2" 2175-2332 3" 2350-3130 4" 3650-3749 5" 6750-5120	Local market	3 - 4 days	2500 m
Wood	Teak Rp 150,000/m ³ Kraing 37,500/m ³	Local market	1 - 60 days	30 m ³

8. Design

1) Number of designers 7 人及び draftsmen 15 人 計 22

必要を充分満たす人数である。

2) Drawing list

3) Drawing method

• Pen

• Pencil

4) Photo copying machine

Blue printing machine 1

Photo copying machine 2

8-1)

The design section has a total of 22 staffs, 7 designers and 15 draftsmen. All the necessary works of drawing are essentially draftable.

9-1)

The yard owns 1 unit of steel-automatic gas cutting machine and uses LPG gas together with acetylene gas for a economic reason. This LPG gas is used only in open space. The cut surface inspected are not smooth, though they are grinding them on occasion demands.

-2)

The yard owns 4 units of automatic welding machines, and the welding technique is satisfactory.

9. Construction Techniques

- 1) Gas cutting work
Semi-automatic gas cutting machine 1 unit, Acetylen gas の 2 台を備えながら、手動を使用している。食し切りの Gas space でのみ使用している。食切後は手動ではない。必要に応じて grinder 作業をしている。
- 2) Welding work
Automatic welding machine 3 台使用、技術良好。
- 3) Gouging method
electrode 5 台を使用、その他 chipping による方法を用いている。
- 4) Faying work
修繕工事であるから、食し切りは良好である。
- 5) Parkling work
修繕工事であり、chack を使って Parkling している。

-3)
-4)
-5)
10-2)

The yard owns 5 units of electrode gougers, and uses them concurrently with chippers.

The workmanship of repair work is excellent

The repairing part is directly marked in chalk

The import procedure of the repairing materials is quite complicated, on the other hand, the quality of most materials locally produced is very bad, and the quantities of these materials often differ from those indicated on the label.

The purity of oxygen, for instance, is about 9% in spite of the nominal purity of 95%. This causes slow cutting and disintegrable cut surface.

The weight of cement often falls short of the specified weight, and the quality of steel plates is low.

The quality of zinc plates is low even if supplied from the client's supplier.

because of the high interest rates of operation money, it seems unattractive as an enterprise.

Employment of workers is quite easy but the employment of engineers is difficult due to deficiency in qualified school graduates.

The term of work is often prolonged by the delayed delivery of imported materials or parts.

Terms of payment in new shipbuilding work, at the time of:

contract	20%
keel laying	10%
finishing	20%
delivery	50%
3 months	10%

New shipbuilding does not well pay because it necessitates a large amount of money for procurement of material and parts and takes much time to receive the imported materials and parts, which results in the increase of money interests and of personal expenses.

Terms of payment in repairing work, at the time of:

	(desirable term)	(actual payment)
Contract	30%	30%
Delivery	20%	20%
3 month	50%	20%

2-3 to 4 month later

Many ships requiring repair go to Singapore where the term of payment is on a advantageous deferred payment basis and the interest rates are relatively low.

10. Points to be noted on shipbuilding & repairing

- 1) Design
- 2) Material procurement
輸入船の船体設計が非常に複雑である。図面に欠陥が多い。表示と内容が異なる。船体設計の表示があるが 5% 位で cutting speed が遅く、食し切りも十分に Cut-off には内容が少い。船体の品質も、Zn 板は完全な食し切りも品質が劣る。
- 3) Construction
船体構造の品質が良く、つぎの点として能力に乏しい。
- 4) Manpower shortage
Worker 及び技術者であるが、技術者は不足し、食し切りも修理も生産性が少なく、既述の如くである。
- 5) Unsatisfactory quality
- 6) Schedule behind
輸入船の入手に長期にかかると、工期が遅れる。
- 7) Inspection trouble
- 8) Others

-3)
-4)
-6)
-5)

New Building の場合の支払条件
Time of contract 20%
Keel laying 10%
Finishing 20%
Delivery 50%
3ヶ月後 10%

Repairing の場合の支払条件
船体設計 5% 食し切り 5%
dock の修理 30% 20% 5%

Singapore における支払い条件は船体設計が 30% 船体修理の支払いが 20% 船体修理の多くは Singapore に渡っている。

船体、船殻を製造するに多額の費用を要し、輸入船を修理に長期にかかると、その間の金利負担、工期の遅れによる損失の増大等があり、船体の品質に乏しい。

(11) NEW SHIPBUILDING RECORDS (A-1-1) 1926

NAME	OWNER	KIND	CLASS	D.V.T.	G.T.	Exp	B	D	ENGINE
1		Bridge			Capacity 15000	12.9	13.4	2.9	
2		"				12.0	13.4	2.9	

NEW SHIPBUILDING RECORDS (A-1-2) 1926

METAL	STEEL	PRICE	CLASS	CONSTRUCTION				REPAIRING				PERIOD IN DOCK
				Contract	Laying	Keel	Delivery	Keel	Keel	Keel	Keel	
1		187,200,000	10-5-1926	7-2-1926	2-4-1926	6-9-1926						
2		187,200,000	10-8-1926	7-2-1926	2-4-1926	23-9-1926						

(12) SHIP REPAIRING RECORDS (B-1-1) 1926

NAME	OWNER	KIND	CLASS	D.V.T.	G.T.	Exp	B	D	REPAIRING PERIOD	PERIOD IN DOCK
1	P.T. P.T. Malacca		(AS)		578					
2	P.T. P.T. Malacca		(SS)		628				1	50
3	Amerasia		(SS)		70				2	5
4	"		(SS)		111				3	1
5	P.T. P.T. Malacca		(SS)		384				4	3
6	Gilmore		(SS)		69				5	2
7	Jabal Kari		(SS)		228				6	4
8	Catherine	Amerasia	(SS)		196				7	4
9	Stuart Hill	P.T. Malacca	(SS)		513				8	1
10	Fernia II	"	(SS)		558				9	22
11	Margaret	"	(SS)		354				10	11
12	M. Sarda	P.T. Malacca	(SS)		504				11	2
13	Sarabaya	P.T. Malacca	(SS)		438				12	3
14	Raja Sura	P.T. Malacca	(SS)		650				13	53
15	Toyo no.1	P.T. Malacca	(SS)		123				14	28

SHIP REPAIRING RECORDS (B-2-1) 1976

	NAME	OWNER	RIND	CLASS	D.V.T.	G.T.	App	B	D		REPAIRING PERIOD	PERIOD IN DOCK
16	Toyo no.3	PT. Polico		(AS)		338						
17	Bahaja VI	PT. Selan Sejahtera		(AS)		1178				16	29	1
18	Kallima	P.J.K.B.		(AS)		2310				17	53	11
19	IK Samudra 197	PT. Samudra Indonesia		(AS)		508				18	13	13
20	Pising	PT. Astril Utra		(AS)		1159				19	33	10
21	Cempak	PT. Palal		(AS)		838				20	31	1
22	PC. B.1803	PT. Pertamina Tk		(AS)		528				21	27	22
23	Bong Man	PT. Karand Utra		(AS)		2004				22	27	27
24	Paratra 109	PT Pertamina		(AS)		2202				23	-	-
25	Paratra 108	PT Pertamina		(AS)		2595				24	160	1
26	Lombok	Bisnis Pengurusan		(AS)		837				25	118	6
27	Ta-Sa-San	PT Pertamina Tk		(AS)		110				26	120	7
28	Ascarja	PT. Samudra Indonesia		(AS)		6136				27	85	11
29	Geitra	PT. Geosri Lloyd		(AS)		5126				28	51	6
30	Kaboni	"		(AS)		6593				29	22	3

SHIP REPAIRING RECORDS (B-3-1) 1976

	NAME	OWNER	RIND	CLASS	D.V.T.	G.T.	App	B	D		REPAIRING PERIOD	PERIOD IN DOCK
31	Sumatra 11	Bisnis Pengurusan		(S.S)		4658						
32	Sura Jaya	PT. Terikora Lloyd		(A.S)		1852				31	103	23
33	Kaboni	PT. Geosri Lloyd		(-)		6593				32	43	3
34	Tag. Renge 180	PT. Rlg Tender Indonesia		(-)		851				33	12	3
35	PC. B.1803	PT. Pertamina Long Rang		(-)		523				34	10	1
36	Pratra	PT. KisaJa Utra		(-)		211				35	11	11
37	Yan Bang VIII	PT. Angkatan Pertambangan		(-)		2311				36	65	11
38	Bjalarano	PT. Bjaranta Lloyd		(-)		9203				37	51	11
39	Sanghe	PT. Palal		(-)		1150				38	13	19
40	Kantun	PT. Pertamina Long Rang		(-)		128				39	-	-
41	IB. Indragiri	"		(-)		129				40	-	-
42	Bejak	PT. Geosri Lloyd		(-)		650				41	-	-
43	Slyne	PT. Pertamina Long Rang		(S.S)		628				42	36	1
44	Arana Seppo	PT. P.P.S.S.		(A.S)		813				43	67	13
45	Luha	PT. Palal		(-)		838				44	20	20
45	Luha	PT. Palal		(-)		838				45	5	5

SHIP REPAIRING RECORDS (B-3-1) 1976

	NAME	OWNER	RIND	CLASS	D.V.T.	G.T.	App	B	D		REPAIRING PERIOD	PERIOD IN DOCK
46	Sungai Paksiang	PT. Pal. Export		(A.S)		967						
47	Sabra	Mr. Kerly		(E.S)		8				46	-	-
48	Palala	PT. Asadi Utra Utra		(A.S)		351				47	13	1
49	Parissela	Offshore Logistics		(-)		60				48	18	2
50	Jabal Kerly	"		(-)		228				49	16	1
51	Catherine	Amerstan Marine S.		(E.S)		156				50	16	1
52	Kristina	"		(-)		156				51	8	1
53	Bisan Pilsabata	"		(-)		156				52	5	1
54	Pacto 1	PT. Eaha Rotera		(-)		31				53	6	2
55	Batra Palza	"		(-)		11				54	13	3
56	Curry	Amerstan Marine S.		(-)		156				55	13	3
57	Bila	"		(-)		20				56	7	1
58	Bisyari	Top Jaya Sakti		(A.S)		320				57	10	1
59	Rathan Forrest	PT. Baruna Gaja Log.		(-)		103				58	26	10
60	Sasudra 14	PT. Farury vas		(-)		82				59	37	3
60	Sasudra 14	PT. Farury vas		(-)		82				60	2	2

SHIP REPAIRING RECORDS (B-5-1) 1976

	NAME	OWNER	RIND	CLASS	D.V.T.	G.T.	Epp	B	D		REPAIRING PERIOD	PERIOD IN DOCK
61	Tk. Kolat 2	PT. Paldirma		(A.S)		315						
62	Bejo Kolok	PT. I.B.L.		(-)		263						
63	Sasdra IX	PT.		(-)		82						
64	Valt	PT. Satria Paritis		(-)		60				61	27	6
65	Sasdra VII	PT. Curaris		(-)		18				62	16	2
66	Fales	PT.		(-)		397				63	2	2
67	Starat III	PT. Pertamina		(-)		523				64	12	2
68	Pallau	P.P.R.A.		(-)		2314				65	4	1
69	Cepelak	PT. Palal		(-)		838				66	-	-
70	P.C. W. 1803	PT. Pertamina Tong Karang		(-)		523				67	22	22
71	Dong Kar.	PT. Karana Line		(-)		3004				68	93	27
72	Bogondo	PT. Palal		(-)		2574				69	39	13
73	Pertina Tunda 1-A	PT. Pertamina Tong Karang		(-)		6850				70	127	27
74	UAT. River	PT. Samudra Indonesia		(-)		251				71	29	1
75	Purpo Isa	"		(-)		1143				72	183	19
										73	59	7
										74	55	7
										75	53	9

SHIP REPAIRING RECORDS (B-6-1)

	NAME	OWNER	RIND	CLASS	D.V.T.	G.T.	Epp	B	D		REPAIRING PERIOD	PERIOD IN DOCK
76	Tb. Rusl	PT. Borbor Engineering		(S.S)		417						
77	Tb. Semere	PT. Pertamina		(E.S)		329				76	33	9
78	Batanghari	PT. Palal		(A.S)		2574				77	24	24
79	Pertina Supply IX	PT. Pertamina Tong Karang		(-)		671				78	100	24
80	Sangit	"		(-)		350				79	5	5
81	Takar 1	PT. Angkatan Pertambangan		(-)		2341				80	5	5
82	Bjattiprera	PT. Bjakarta Lloyd		(-)		9793				81	7	7
83	Senghe	PT. Palal		(-)		4150				82	62	13
84	Tb. Kanton	PT. Pertamina Tong Karang		(-)		128				83	39	16
85	Tb. Indragiri	"		(-)		129				84	40	16
86	Pertina Supply 3 & Work Boat	"		(-)		3064				85	15	2
87	Dong Kar	PT. Karana Line		(-)		3004				86	4	4
88	Bekilang	PT. Goniel Lloyd		(-)		2007				87	43	5
89	Pertina Supply 11	PT. Pertamina Tong Karang		(-)		671				88	10	3
90	Sangit	"		(-)		350				89	3	3

SHIP REPAIRING RECORDS (B-7-1)

	NAME	OWNER	RIND	CLASS	D.V.T.	G.T.	Epp	B	E		REPAIRING PERIOD	PERIOD IN DOCK
91	Pertina Tunda 1	P.T. Pertamina Tong Karang		(A.S)		342						
92	Sangit	"		(-)		350						
93	Sidang	"		(S.S)		185						
94	Anasa Gappa	PT. P.P.S.S.		(A.S)		813				91	15	3
95	Pertina Tunda 1-B	PT. Pertamina Tong Karang		(-)		6850				92	11	11
96	Bakabul	PT. Perkeb. Barat		(-)		500				93	59	11
97	TATA Bone	P.P.P. Tanjung Brick		(-)		144				94	11	11
98	Pisang Tembaga	PT. Astel Line		(-)		1351				95	39	4
99	Sau Batangai	PT. Bjakarta Lloyd		(S.S)		7338				96	48	11
100	Emar	PT. Goniel Lloyd		(A.S)		5523				97	11	11
101	UAT. Nektatell	A.L.R.I.		(S.S)		4545				98	11	11
102	PENKAA Supply 12	PT. Pertamina Tong Karang		(A.S)		671				99	53	7
103	Adigedap	PT. Garas		(-)		2552				100	41	8
104	Pertina Tunda 1-C	PT. Pertamina Tong Karang		(-)		6850				101	57	14
105	Valt	PT. Satria Paritis		(-)		60				102	8	8
										103	8	8
										104	41	6
										105	6	6

SHIP REPAIRING RECORDS (8-8-1) 1976

	NAME	OWNER	RIND	CLASS	D.V.T.	G.T.	Exp	B	D		REPAIRING PERIOD	PERIOD IN DOCK
106	Genefa	PT. Centri Lloyd		(A-S)		8590						
107	Anarya Gappa	PT. P.P.S.S.		(=)		813				106	22	6
108	Laba	PT. Pelal		(=)		838				107	20	20
109	Sungai Pakning	PT. Pelajaran Bahari		(=)		567				108	45	5
110	Bagas	PT. Bahari Bahera		(S-S)		851				109	31	16
111	Rahmat	PT. Perintis Ltd		(A-S)		580				110	28	9
112	Royal Abadi	PT. Abadi Takti Line		(=)		682				111	45	6
113	Witadajaja	PT. Pedjaja		(=)		171A				112	15	5
114	Staret III	PT. Partanira		(=)		523				113	3	3
115	Thp. Pelat II	PT. Tridharma		(=)		315				114	6	6
116	Pelange	PT. Pelal		(=)		545				115	18	5
117	Berge Pelagan	PT. Samudra Indonesia		(=)		339				116	0	0
118	Pacco II	PT. Raja Rector		(S-S)		6				117	17	1
119	Kabari	Mr. Robertson		(A-S)		20				118	8	8
120	PSC III	PT. Partanira Tong Rang		(=)		19				119	24	6

SHIP REPAIRING RECORDS (8-9-1) 1976

	NAME	OWNER	RIND	CLASS	D.V.T.	G.T.	Exp	B	D		REPAIRING PERIOD	PERIOD IN DOCK
121	Pattilavind	PT. Sira Pat		(S-S)		7						
122	LOK Kondo 2	PT. Lual Tista		(A-S)		50				121	2	2
123	Samudra IX	PT. Pananjung		(=)		82				122	-	-
124	Kate	PT. Satela Partita		(=)		69				123	68	2
125	Samudra III	PT. Garuda		(=)		88				124	56	12
126	Kelas	PT. Garuda		(=)		357				125	41	4
127	Saraguna W	PT. Samudra Indonesia		(=)		262				126	10	10
128	Beruna 333	PT. Beruna Raja Log.		(=)		95				127	18	18
129	Canara	PT. Big Tender Indonesia		(=)		308				128	10	2
130	Staret II	PT. Partanira		(=)		292				129	21	6
131	Beruna 3	PT. Beruna Raja Log.		(=)		95				130	26	26
132	Saraguna Y	PT. Samudra Indonesia		(=)		262				131	10	8
133	Karell	PT. Partanira		(=)		35				132	11	11
134	Saraguna W	PT. Samudra Indonesia		(=)		510				133	1	1
135	Brita	Amerstan Marine S.		(S-S)		20				134	10	1

SHIP REPAIRING RECORDS (8-10-1) 1976

	NAME	OWNER	RIND	CLASS	D.V.T.	G.T.	Exp	B	D		REPAIRING PERIOD	PERIOD IN DOCK
136	Karata	PT. Abadi Takti Lines		(A-S)		439						
137	Staret III	PT. Partanira		(=)		523				136	-	-
138	Permana Supply IX	PT. Partanira Tong Rang		(=)		621				137	22	22
139	Sangit	"		(=)		350				138	61	5
140	Takari I	PT. Anglitan Partanangan		(=)		2341				139	115	6
141	Bicoll 01	PT. Bicoll		(=)		1041				140	56	7
142	Suber Pas II	PT. Salsalatra		(=)		254				141	43	8
143	B.R.R.A	Bivisi Pengendalian		(S-S)		1831				142	0	3
144	BSE. Parice	"		(A-S)		15A				143	16	16
145	Karell	PT. Partanira		(=)		35				144	37	11
146	KK. Lombok	Bivisi Pengendalian		(S-S)		837				145	10	10
147	Permana	PT. Partanira Tong Rang		(S-S)		128				146	10	10
148	Kalatas	P.J.R.A.		(A-S)		231A				147	-	-
149	Anarya Gappa	PT. P.P.S.S.		(=)		813				148	-	-
150	TetA Bure	PT. Tanjung Prick		(=)		11A				149	24	11

SHIP REPAIRING RECORDS (8-11-1) 1976

	NAME	OWNER	KIND	CLASS	D.V.T.	G.T.	App	B	B		REPAIRING PERIOD	PERIOD IN DOCK
151	Peratra Supply 12	PT. Pertamina Yang Rang		(A.S)		671				151	5A	6
152	Adipodaj	PK. Garan		(-)		2922				152	36	6
153	Pajonge	PT. Pelal		(-)		545				153	5	5
154	Tolando	"		(-)		3235				154	6	6
155	Peratra Yunda I	PT. Pertamina Yang Rang		(-)		422				155	105	6
156	Bjattinegara	PT. Djakarta Lloyd		(-)		8219				156	51	10
157	Yaporas	PT. Pelal		(-)		7120				157	7	7
158	Getora I	PT. Sesuri Lloyd		(-)		5A18				158	51	7
159	Bjattibare	PT. Djakarta Lloyd		(-)		8817				159	42	3
160	N. Agus Salla	"		(-)		6813				160	6	6
161	Bjattisari	"		(-)		7332				161	42	12
162	Pancaraj Sinar	PT. Samudra Indonesia		(-)		5057				162	5	5
163	Gempita	PT. Sesuri Lloyd		(-)		5650				163	18	19
164	Bela	PK. Pertamina		(-)		6339				164	6	6
165	Tirtadajaja	PT. Peljala		(-)		1214				165	113	3

SHIP REPAIRING RECORDS (8-12-1) 1976

	NAME	OWNER	KIND	CLASS	D.V.T.	G.T.	App	B	B		REPAIRING PERIOD	PERIOD IN DOCK
166	Pajonge	PT. Pelal		(A.S)		545				166	45	8
167	Kargo Belagan	PT. Samudra Indonesia		(-)		390				167	3	3
168	Geopa Raja	PT. Ind. Oriental Line		(-)		475				168	3	3
169	Kelas	PK. Garan		(-)		332				169	40	40
170	B.K.I. Siguntang	PT. Nisaya Nitro		(-)		143				170	5	5
171	Siora	PT. Pertamina Yang Rang		(-)		65A				171	26	5
172	Tkg. Relati V	PT. Bharu Utara		(-)		315				172	6	6
173	Arana Gappa	PT. P.P.S.S.		(S.S)		813				173	-	-
174	Pattasira	PT. Sisa Pat		(E.S)		7				174	33	2
175	IGA Kondo 2	PT. Bumi Lita		(A.S)		50				175	50	83
176	Planet II	PK. Pertamina		(-)		282				176	115	26
177	Sawa Kura W	PT. Samudra Indonesia		(-)		262				177	121	11
178	Kancil	PK. Pertamina		(-)		35				178	51	1
179	Sawa Kura VI	PT. Samudra Indonesia		(-)		519				179	28	1
180	Kenta	PT. Abadi Inti Line		(-)		599				180	3A	11

SHIP REPAIRING RECORDS (8-13-1) 1976

	NAME	OWNER	KIND	CLASS	D.V.T.	G.T.	App	B	B		REPAIRING PERIOD	PERIOD IN DOCK
181	Pacto I	PT. Raja Actor		(A.S)		13				181	29	2
182	Sawa Kura VI	PT. Samudra Indonesia		(-)		257				182	42	12
183	Charles	Uden Intera Iza.		(-)		141				183	24	4
184	Zitena	PT. Big Tender		(-)		29				184	22	7
185	St. Samudra II	PT. Samudra Indonesia		(-)		82				185	33	8
186	Pastisala	PT. Baruna Raja Log		(E.S)		61				186	6	1
187	Baruna III	"		(-)		15				187	6	1
188	Carson	PT. Big Tender		(A.S)		116				188	6	1
189	Baruna III	PT. Baruna Raja Log		(E.S)		15				189	1	1
190	Big-Prosperous	P.A.L. Tanjung Brick		(A.S)		247				190	3	3
191	Artifan	PT. Baruna Raja Log		(-)		63				191	26	1
192	Artifan	"		(-)		63				192	18	1
193	North Wind	PT. Big Tender		(-)		50				193	3	3
194	Planet III	PK. Pertamina		(-)		523				194	63	22
195	R.K. Ara	Bivalat Pengemas		(S.S)		1831				195	45	45

SHIP REPAIRING RECORDS (8-14-8) 1976

	NAME	OWNER	KIND	CLASS	D.V.T.	G.T.	App	B	D		REPAIRING PERIOD	PERIOD IN DOCK
196	K.R. Lombok	Divisi Pengerukan		(E-S)		837						
197	Medrano	PT. Pertamina Tong Rang		(S-S)		128				196	59	19
198	Kralatan	P.P.R.A.		(A-S)		2314				197	102	42
199	Bengawan	P.T. Patil		(E-S)		2575				198	125	33
200	Tembang Samudra	PT. Pertamina Tong Rang		(A-S)		393				199	3	3
201	Balagta IV	PT. Tel. Selan Sejahtera		(=)		2154				200	14	4
202	Talari II	PT. Angkutan Perintis		(=)		2341				201	41	4
										202	23	23
203	Samber Tunas II	PT. Tel. Naga Laut		(=)		2353				203	75	14
204	Pernira Supply 4	PT. Pertamina Tong Rang		(=)		671				204	12	12
205	Pernira Supply 2	"		(=)		671				205	12	12
206	Tomboka	PT. Patil		(=)		2235				206	7	7
207	K.Pernira III	PT. Pertamina		(S-S)		2332				207	-	-
208	Tempas	PT. Patil		(A-S)		2120				208	163	7
209	Padji Agas Salin	PT. Bijkarta Lloyd		(=)		6813				209	24	6
210	Pancaran Sitar	PT. Samudra Indonesia		(=)		5057				210	61	5

SHIP REPAIRING RECORDS (8-15-8) 1976

	NAME	OWNER	KIND	CLASS	D.V.T.	G.T.	App	B	D		REPAIRING PERIOD	PERIOD IN DOCK
211	Gempita	PT. Sesar Lloyd		(A-S)		5600				211	27	19
212	Etin	PT. Pertamina		(=)		6339				212	43	6
213	Bendi X	PT. Galon Garuda		(=)		228				213	29	5
214	Barang	PT. Sesar Lloyd		(=)		925				214	32	5
215	Rebon Agung	PT. Pelita		(=)		2134				215	50	11
216	Pernira Supply III	PT. Pertamina Tong Rang		(=)		671				216	11	11
217	K.C.R.B. 2501	PT. Palagada		(=)		700				217	30	3
218	Barge B-25	PT. Rig Tender Ind.		(=)		108				218	35	3
219	Latran	PT. Patil		(=)		522				219	25	13
220	Selat Sunda	BNP. Ig. Patok		(=)		152				220	27	3
221	Puasangan	PT. Pertamina Tong Rang		(=)		134				221	31	10
222	Brono	Divisi Pengerukan Btu		(=)		1235				222	19	18
223	Bargas	PT. Pertamina		(E-S)		8793				223	4	6
224	Fig. Turbine 142	PT. Patil		(A-S)		100				224	25	6
225	Fig. Turbine 123	PT. Patil		(=)		100				225	25	6

SHIP REPAIRING RECORDS (8-16-8) 1976

	NAME	OWNER	KIND	CLASS	D.V.T.	G.T.	App	B	D		REPAIRING PERIOD	PERIOD IN DOCK
226	Bung Guntur	PT. Bijkarta Lloyd		(A-S)		4210				226	47	5
227	Kralatan	P.P.R.A.		(=)		2314				227	2	2
228	Anava Gappa	PT. P.P.S.S.		(S-S)		813				228	2	2
229	EX Solvesel II	Divisi Pengerukan Btu		(A-S)		2532				229	06	15
230	Pernira Supply IV	PT. Pertamina Tong Rang		(=)		671				230	18	18
231	Bargas	PT. Pertamina		(E-S)		8793				231	14	14
232	Pisang Elang	PT. Astek Awa		(A-S)		1796				232	12	12
233	Sudarta	PT. Tritora Lloyd		(=)		3520				233	3	3
234	Sangatta	PT. Pertamina		(=)		9557				234	-	-
235	Bajo Delapan	PT. Samudra Indonesia		(=)		399				235	177	3
236	Rezo Raja	PT. I.B.L.		(=)		475				236	159	2
237	Ketes	PT. Garas		(=)		397				237	133	10
238	R.A.H. Siguntang	PT. Wisaga Nitro		(=)		443				238	59	5
239	Fig. Metall W	PT. Chara Vihara		(=)		315				239	35	4
240	Anava Gappa	PT. P.P.S.S.		(S-S)		813				240	16	16

SHIP REPAIRING RECORDS (8-17-1) 1976

NO.	NAME	OWNER	KIND	CLASS	D.W.T.	G.T.	Lpp			REPAIRING PERIOD	PERIOD IN DOCK	
							B	D	P			
241	Gilijang	Pt. Garas		(A.S)		597				241	109	22
242	Koda Sifat II	Pt. Palpa		(")		527				242	62	7
243	Cipta III	Pt. Pantonja		(")		520				243	57	3
244	Deza Mullu	Pt. P.O.A.		(")		358				244	4	1
245	LCT. Serungma VI	Pt. Samudra Indonesia		(")		510				245	-	-
246	Pattalana	Pt. Sira Pat.		(E.S)		7				246	3	3
247	Srihandi	Pt. Bapa Motor		(")		15				247	12	5
248	Sabro	Pt. Ferry		(")		9				248	21	8
249	Reberl	Pt. Robert		(A.S)		29				249	7	7
250	Pacto II	Pt. Bapa Motor		(")		6				250	8	8

(13) DAD FACILITIES

1. BERTH & DOCK

NO.	NAME & TYPE	DIMENSION		POS. SIZE OF SHIP				G.T.	D.W.T.	USE
		L (M)	B (M)	Lpp (M)	B (M)	D (M)	d (M)			
1	Building Berth	150	17.0					5000		B
2	Slipway-repair	70	12.55					TLC 1250		R
3	Slipway-repair	20	5.5					TLC 100		A
4	Floating dock	150	23.9					TLC 10000		R
5	Floating dock	130	19.95					TLC 6500		R
6	Floating dock	73	14.95					TLC 600		R
7										
8										
9										
10										

USE = Building (B), Repairing (R), Building & Repairing (B & R)

2. CRANES

NO.	TYPE	POS. LIFT LOAD	POS. ELEVATION	POS. REACH	NUMBER	LOCATION
1	R. C.	10 T			2	
2	R. C.	5 T			2	
3	O. H. C.	20 T			2	
4	O. H. C.	10 T			2	
5	O. H. C.	3 - 5 T			8	
6	T. C.	25 T			1	
7	P. C.	10 T			1	
8	P. C.	5 T			1	
9	P. C.	3 T			2	
10	Fork lift	5 T			1	
11	Fork lift	3 T			1	
12	Fork lift	2 T			1	
13	Dock crane	10 T			2	
14	Dock crane	3 T			2	
15						

Type: Portal crane (P.C.), Over Crane (O.H.C.), Tower Crane (T.C.)
 (Lull Lifting crane (L.L.C.), *L = Stage Crane (S.C.), Avilla Crane (A.C.)

(3) YARD & SHOP

Stage & Shop	Area (sq)		
	Total area	Shop area	Yard area
Shipbuilding			
Steel stock yard			
Fabrication shop			
S. assembly shop & yard			
Assembly shop & yard			
Grand assembly yard			
Block stock yard			
Berth & Dock			
Pipe stock yard			
Machinery shop	4200		
Carpenter shop	2850x7, 1560x7		
Plater shop	4500		
Electrical shop	570		
Painting shop			
Outfitting shop			
Rigging shop			
Iron & Casting shop	1350		
Warehouse	1300x2, 300x7		
Welding shop	600		
Pipe shop	1130		
Roof loft	545x7, 152x7		
Bracing room	200		
Repairing			
Berth & Dock			
Mill shop			
Machinery shop			
Outdoors working area			
Stockyard			
Ware-house			
Overhead			
General shop & Power station	1250x7, 875x7		

(4) MACHINERY & EQUIPMENT

No.	TYPE CAPACITY		LOCATION	NUMBER	
44	Sand blasting	150/cu ³	1974	Plater shop	2
1	Straightening roll	1 1/2"	1929	"	1
2	Bending roll	3/2"	1932	"	1
3	"	5/8"	1921	"	1
4	Plate Shear	1/2"	1948	"	1
5	"	1/2"	1939	"	1
6	Profile Shear		1916	"	1
7	Rolling press	65 ton	1935	"	1
8	"	150 ton	1954	"	1
9	"	250 ton	1939	"	1
10	Rolling Press	0.65 ton	1920	"	1
11	"	0.5 ton	1927	"	1
12	Fracture chipping chisel	612/cu ³	1973	"	6
13	Drilling Machine	32x/nd	1916	"	1
14	"	50x/nd	1929	"	2
15	"	12x/nd	1953	"	1
16	Rolling Machine	12x/nd	1916	"	1
17	Drilling Machine	650x/nd	1930	"	1
18	Furnace	2.50"		"	3
19	Working table	8x2		"	1
20	Overhead Crane	10 ton		"	1
21	"	5 ton		"	2
22	"	2 ton		"	1
23	Welding Generator	1000 Amp.	1964	Welding shop	3
24	"	800 Amp.	1954	"	1
25	Welding transformer	1600 Amp.	1970	"	2
26	"	400 Amp.	1971	"	2
27	"	250 Amp.	1971/74	"	71
28	Welding Converter	200-300 Amp.	1965/71	"	30
29	Self automatic welding machine	250 Amp.	1974	"	2
30	Welding floor	72x2		"	1
31	"	54x2		"	1
32	Rectifier generator	4kg	1920	"	7
33	Automatic welding machine	1500 Amp.	1973	"	1
34	Cutting torch			"	60

MACHINERY & EQUIPMENT

No.	TYPE CAPACITY		LOCATION	NUMBER	
35	Cutting floor	12x2		Welding Shop	1
36	Overhead Crane	5 ton		"	1
37	Pipe bending machine	6"x	1971	Pipe Shop	1
38	"	3"x	1938	"	1
39	Grinding machine	6"x		"	1
40	Bending table	60"		"	1
41	Drill	250x/nd	1950	"	1
42	Working table	6x2		"	1
43	Roll saw	200x/nd	1973	"	1
44	Lathe	200-300x/nd	1945	"	1
45	Thread cutting machine	150x/nd	1926	"	1
46	"	62x/nd	1945	"	1
47	Lathe	1200x1800x/nd	1972	Machinery Shop	1
48	"	26 1/2" x 350"	1920	"	1
49	"	10 1/2" x 200"	1933	"	1
50	"	10 1/2" x 82"	1949	"	2
51	"	63" x 79"	1916	"	1
52	"	47 1/2" x 57"	1947	"	12
53	Turret Lathe	8 1/2" x 11"	1947	"	1
54	"	6 1/2" x 12 1/2"	1955	"	2
55	Vertical lathe	2000x1500x/nd	1921	"	1
56	"	1250x1000x/nd	1947	"	1
57	"	1000x750x/nd	1947	"	1
58	Precision Lathe	150x1000x/nd	1950	"	2
59	Vertical Drilling Machine	150x/nd	1973	"	2
60	Radial Drilling Machine	150x/nd	1945	"	1
61	"	70x/nd	1937	"	1
62	Horizontal Drilling Machine	35" x 20"	1921	"	1
63	"	1000x2000x/nd	1972	"	1
64	"	300x1000x/nd	1949	"	1
65	Vertical Drilling Machine	50" x 75"	1936	"	1
66	"	62" x 25"	1937	"	1
67	"	12" x 50"	1947	"	1
68	"	1000x3000x/nd		"	1
69	"	2000x2000x/nd		"	1

MACHINERY & EQUIPMENT

No.	TYPE CAPACITY		LOCATION	NUMBER	
20	Press	30 ton	1961	Machinery Shop	1
21	Roll saw	1000x/nd	1965	"	1
22	Roll grinding machine	6"x	1949	"	1
23	Grinding Machine	6"x	1950	"	2
24	Portable Boring Machine	200x500x/nd		"	1
25	Overhead Crane	20 ton		"	1
26	"	5 ton		"	1
27	Wood lathe	150x2500x/nd		Carpenter shop	1
28	"	16" x 62"		"	1
29	Circular saw	32"x	1927	"	1
30	"	29"x	1947	"	1
31	Saw mill	800x/nd		"	1
32	Band saw	1400x/nd	1927	"	2
33	"	400x/nd		"	1
34	Planing machine	wide	300x/nd	"	1
35	"	"	250x/nd	"	1
36	"	"	20x/nd	"	1
37	"	"	40x/nd	"	1
38	Drill	3"x	1928	"	1
39	"	1 1/2"x	1945	"	1
40	Drilling machine			"	1
41	Swing machine for tarpulin		1945	"	1
42	Overhead Crane	2 ton		"	1
43	"	5 ton		"	1
44	Drying chamber	13x1		Iron Casting Shop	1
45	Cast iron melting furnace	1 ton		"	1
46	"	5 ton		"	1
47	"	3 ton		"	1
48	Non ferrous melting furnace	300 ton		"	1
49	"	500 ton		"	1
100	Wood lathe	19" x 25"	1950	"	1
101	Drilling	32x/nd		"	1
102	Overhead Crane	3 ton		"	1
103	Coil Winding Machine	0.2kg/min.	1949	Electrical Shop	2
104	Furnace	17x3	1973	"	1

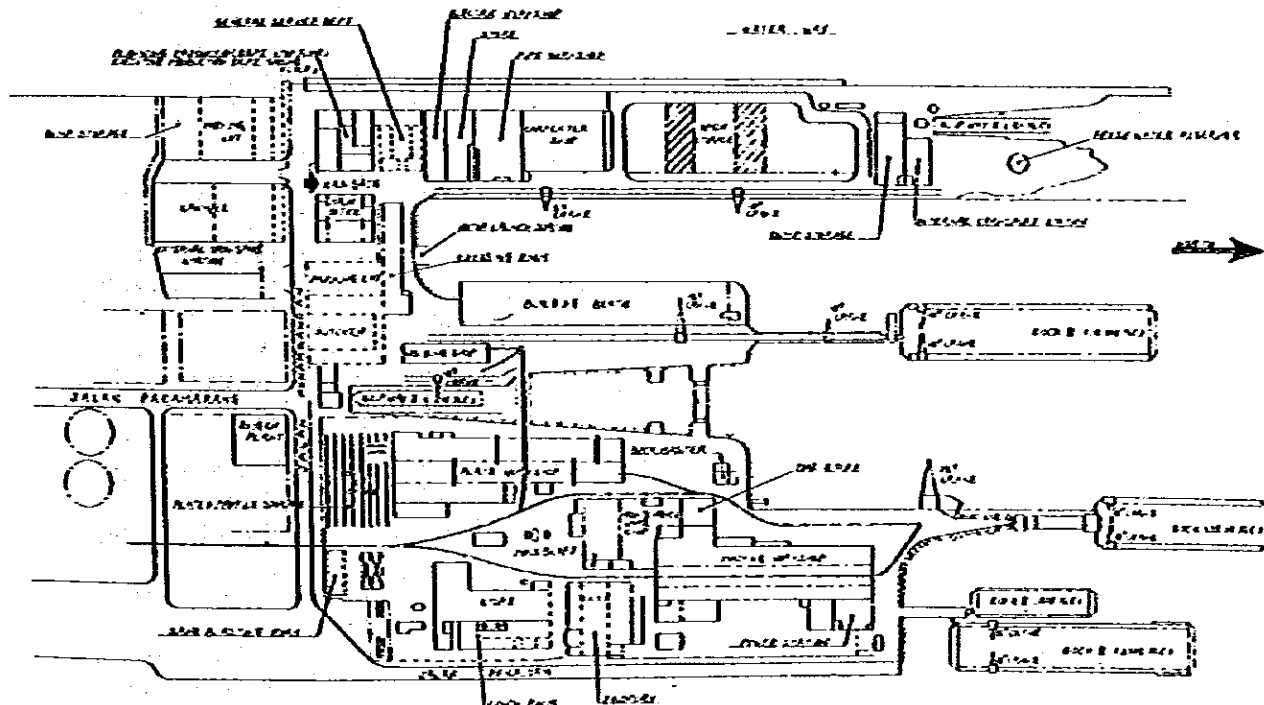
INSTRUMENT & EQUIPMENT

	TYPE CAPACITY	LOCATION	NUMBER
105	Lathe 5' x 16"	Electrical Shop	1
106	" 20' x 57"	"	1
107	Drilling (hand)	"	1
108	" 32"/rd	"	1
109	Battery charger 6V/35Amp.	"	1
110	Overhead crane 2 ton	"	1
111	Braving floor 450 x 220	Roofed loft	1
112	" 100 x 50	"	1
113	Braving board (table) 150x90cm	Braving/heat setting room	6
114	" 155x100cm	"	8
115	" 320x110cm	"	1
116	Braving printing machine (blue print) General	"	1
117	Calculator Manual	"	2
118	" Electric	"	2
119	Planimeter	"	1
120	Photo copy Canon	"	1
121	" Toshiba	"	1
122			
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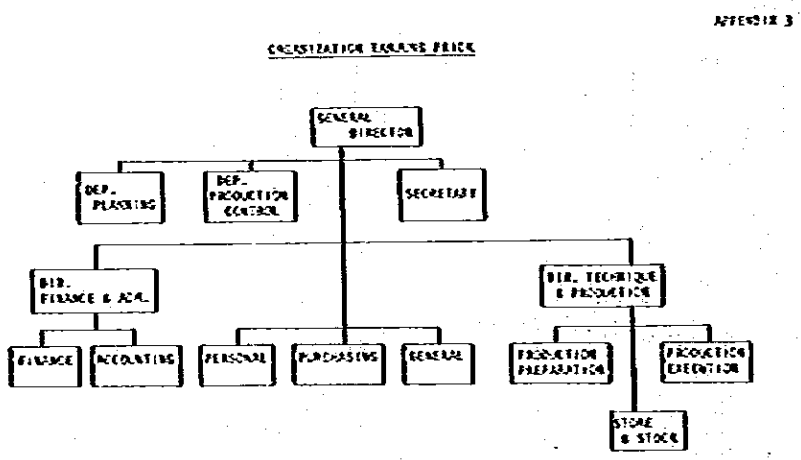
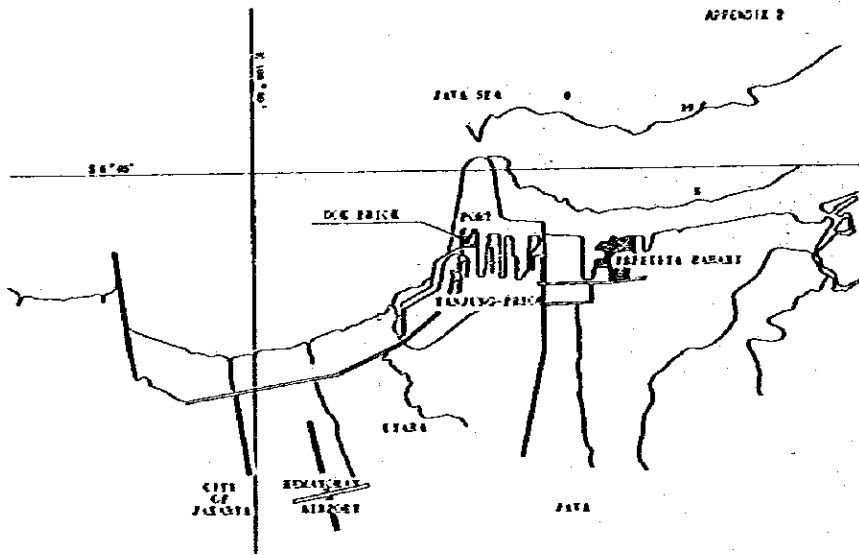
(5) Utilities

Items	Capacity
Electric Power	Kinds of power : AC - 50V 3-ph. 60Hz. 380 & 220V 3-ph. 50Hz. 220 & 110V 1-ph. DC - 220 & 110V. Power consumption: 35,000 KWH per month. Sources & total capacity : - PMA's substation transformers 2,650 KVA. - Self-owned emergency generators 1,035 KVA.
Drinking & Industrial Water Facilities	Water supplied by PMA. Daily consumption: 250 tons.
Compressed Air Facilities	Sources : Stationary and mobile units. Total capacity : 80,400 l/min. at 7-8 kg/cm ² .
Acetylene & Oxygen Facilities	Daily consumption: Oxygen 350 K3 Acetylene 10 K3 L.P.G. 75 K3 A self-owned Oxygen plant supplies the oxygen to bottles.
Water Pollution Control Facilities	Chemicals are used in treatment of polluted water.
OTHERS	Ring main system for electric power supplies. Pipe lines system for supplies of : compressed air, fresh and sea water, and liquid oxygen in the near future.

APPENDIX B



LAY OUT
TAMJUNG PRIK
MAY 1968



II. P.T. IFFA GAYA PAMU SEMARANG

1. General Situation

1-1. Introduction

Like the Cirebon Shipyards, this shipyard is located in an important port on the northern coast of Java, though the head office is at Tanjung Priok, Jakarta. P.T. IFFA GAYA PAMU was established in July, 1965, by reorganizing the business of P.T. IFFA which had already been in operation.

The new shipbuilding business turn-out of this shipyard is 4210/G of 19 ships in the year 1971, 11500/G of 6 ships in 1972, 5650/G of 3 ships in 1973, 11000/G of 5 ships in 1974, and 25000/G of 7 ships in 1975. As for the repair business turn-out, it recorded a total of 72 ships of various sizes by the year 1976.

At the time of our inspection, re-construction work was going on in this shipyard, and the berth (50.00m L x 10.00m B x 4.00m D), the drawing shop, and the four plate shops were being pulled down while a new pipe shop was under construction near the outfitting quay to the north of these shop buildings being pulled down. For the time being, the mould loft, the plate shop, the warehouse, etc. on the lay-out have not been completed yet. The steel materials consumed at this shipyard so far are 356t in the year 1971, 553t in 1972, 402t in 1973, 514t in 1974, and 1130t in 1975.

1-2. Conditions of location

This shipyard is located in the recess of the port of Semarang, and nobody can enter the shipyard without permission of the guardmen because it is in the port area. Full scale re-construction and rearrangement of the shipbuilding facilities are now in progress, and the whole shipyard will be renovated when they are completed.

In this re-construction plan, a 3000/G new shipbuilding berth and two 50m x 15m plate shops are scheduled to be newly established there. Effective rotation of the new berth will require careful lay-out or positioning of the steel material stockyard, the block storing area, etc. The population of this city is about 1,000,000 and most employees of this shipyard are said to ride a bicycle back and forth to work.

1-3. Shop facilities

In the present re-construction plan, replacement of old machines with the latest ones is concurrently being promoted with renewal of the other facilities and the shop buildings. Most machinery in the machine shop is superannated and the accuracy upkeep of the

nearly thirty years old machinery is very difficult, though the lathe and the boring machine are said to be new models of 1975 and 1976 respectively. Like other shipyards, the quay facilities are very poor and require immediate reinforcement. As for the craft facilities, only the fixed 3-40t tower crane deserves special mention here.

1-4. Organization, Employees, and Labour Conditions

This shipyard has strong connection with Japan, and of the four general manager and managers, three have received managerial training in Japan. Most employees have duly settled down here, and have more than five years' experience. The regular work hours per week are 38.5H. As for lunch, only the main meal is served, and Rp. 100 is supplied to each employee as expenses of side dish or subsidiary food. The workers buy side dishes at near-by stores in groups, or their families bring them in by turns.

1-5. Production Management and Production Technique

The production is being managed in accordance with an ordinary production schedule. The cutting gas used in this shipyard is L.P.G. and acetylene gas supplied in bottles. The cutting accuracy is average, and the welding technique is excellent at least outwardly.

At the time of shell plate replacement, a leak test is carried out by coating oil over the internal surface and white powder over the external surface. The spot welds are skillfully made up of 7 to ten rectangular timbers. On the whole, the hull work technique is excellent.

1-6. Production Efficiency and Term of Work

The man-hours of new shipbuilding are 2168/ton for tugs, and 3152/ton for cargo boats. The average efficiency of ship repairing work is 4262/ton. The term of new shipbuilding work for a 7500/G coaster is 12 months from keel laying to launching, and 4 months from launching to completion. In the case of 4000/G tugs, it is 5.5 months from keel laying to launching, and 1.5 months from launching to completion. The number of ships repaired at this shipyard in the year 1976 is 72. According to the annual production schedule, one each of 10000/G and 30000/G ships are planned to be newly built each year, and a total of 60 ships is planned to be repaired, 40 in the graving dock and 20 on the berth. Most of the vessels repaired so far are wooden ships.

1-7. Subcontractors

The shipyard employs about 40 subcontractor

workers for its painting, plating, welding, and wood work. These workers belong to only one subcontractor.

1 - 8. Design

All the necessary drawings are domestically supplied. The head office in Jakarta covers up to the detailed designs, and the main design work left to the yard is finish drawing.

1 - 9. Material Procurement

Most steel materials, welding rods, paints, etc., are locally procured, though the main and auxiliary engines, and the steel materials, are ordered through Jakarta office. Like all other shipyards, the relative delivery of imported goods is one of the most suffering problems.

There are considerable stocks of IIP, valves, etc., in the material warehouse, though they are not in good order.

III QUESTIONNAIRE

1. General

- 1) Layout of shipyard (Appendix 1) P.T. 1774 BATA BANG SERANG
- 2) Location and map (Appendix 2) Jl. Asahan No. 3 Serang
- 3) Area: Area of premises 17,362 m²
Area of production "
- 4) Annual production capacity
New shipbuilding 8,000 B/T
Shiprepairing 55,000 B/T
- 5) Water depth: 4 m
- 6) Tide: Difference 1 m
- 7) Current: No

2. Yard expansion plans:

No

3. Organization and number

- 1) Tree diagram (Appendix 3)
- 2) Number of employees for each rank
Director and manager 1 persons
Section chief and sub section chief 34 persons
Foreman and group chief persons
Worker 117 persons
- 3) Family structure of education
S.D. Elementary school (6 years) 102 persons
S.A.T.P. (S.R.P., ST ...) Secondary school (3 years) 111 persons
S.A.T.A. (S.R.A., S.T.N.) High school (3 years) 258 persons
AUGER College (3, 4 years) 8 persons
UNIVERSITY (4, 5 years) 6 persons

4) Annual supply of R.A. and workers

	1971	1972	1973	1974	1975	1976	1977
R.A.	0	0	0	0	0	1	1
Workers	0	0	0	0	0	43	0

5) Overtime allowance for each hour

Working time: Mon-Thur 07:00-11:30, 12:00-11:30
Fri 07:00-11:30
Sat. 07:00-11:00 30.5\$/week

6) Ratio of annual salary up

Amount of salary up will be decided according to the result of General meeting of managing director.

7) Welfare equipment

Equipment for tennis soccer, Badminton and table tennis are available once or twice a week.

8) Food supply

Lunch: Boiled rice and Rp100.
Dinner: Shipyard supply

9) Traffic expense

Including in salary with same rate.

10) Insurance

Insure worker's accident.
Shipyard pay doctor expense for worker and family.

11) Safety for worker

Apply government rate.

12) Training of worker

For welder: Every year 15 persons/one time, 3 months/one time, twice/year
Teacher come from Bandung. Morning lecture
Afternoon practice.
Machine
Installation: From Apr. '76 to Mar. '77 40 workers, 2 hours/day
Teacher come from Jakarta

4. Subcontractor

- 1) Kind of skill: Painter, Plater, Welder, Wood worker
Number of workers: ab. 40 persons
Wage:
- 2) Degree of skill
- 3) Number of company
1 company

5. Tools

- 1) Size of tool store
- 2) Main tools
a) Air
b) Electric
c) Hydraulic
d) Hammer, spanner, etc.

6. Productivity

1) New Shipbuilding

	Type, Kind, B/T of Typical Ships	Full Weight	Man-hours (Full Part)	Total Man-hour
I				
II				
III				

- b) Hull construction I) Barge 210 hours/Ton
II) Ship 315 hours/Ton
- c) Hull construction I) Barge Rp 125,000 cost/Ton
II) Ship Rp 190,000 cost/Ton
- d) Construction period
I) as the (I) year
II)
- 2) Shiprepairing 1976
a) Total gross tonnage per year: Wood Ship 362 ships 5,200 MT/year
Steel Ship 125 ships 29,850 MT/year
b) Total man-hours per year: hour/year
c) Total sales amount per year: \$/year
d) Man-hour/steel ton (in the case of steel replacement): 420 hour/ton
e) Cost/MT
f) Cost/ship
g) Repairing period I)
II)

7. Material procurement

Item	Purchase Price	Where Purchased from	Order-to-Delivery time	Stock Amount
Main Engine		Japan Hitachi Europe	6-10 months	-
Generator		Japan Fuji	"	-
Steel Plate	Rp180/kg	Local	Immediate	20 Ton
Profile	Rp180/kg	Local	"	5 Ton
Welding Rod	Rp370/kg	Local	3 days	3 Ton
Paint	A/E Rp2000/kg A/F Rp3500/kg C/F Rp2500/kg	Local	2-3 days	10 Ton
Pipe		Low press, Local High press, Japan	Immediate 4 months	each size 10 pis
Wood Teak Luan	Rp2-30000/33 Rp 50000/33	Local	1 week	30 m ³

8. Design

- 1) Number of designers One (1) chief and six (6) designers
- 2) Drawing list Finishing plan: GA, midship section, const, profile, piping, electrical etc.
Rearrangement plan, Repair plan and sometimes detail plan.
- 3) Drawing method
+ Pen
+ Pencil
- 4) Photo copying machine JEPIC x 1 set

9. Construction techniques

- 1) Gas cutting work

2) Welding work

3) Bending method

4) Fitting work

5) Packing work

10. Points to be noted on shipbuilding & repairing

1) Design

Job-to office can make all drawings from basic design.
Tank test for resistance held in Japan.

2) Material procurement

Delay for import material

3) Construction

Sometimes cannot get the parts same as the drawing, to get B.N.I. approval for revision gives some trouble.
Quality Improvement is very difficult.

4) Power shortage
Enough power

5) Dissatisfactory quality
Keeping good accuracy in machining is difficult because of old machine.

6) Schedule behind
On new shipbuilding actually get 6-12 months behind owing to late coming of parts.

7) Inspection trouble
No trouble

8) Others
1. Loan from the bank effects high cost and makes difficult to decide facility investment.
2. New building demand is too small because of money shortage of private shipping company.

(11) NEW SHIPBUILDING RECORDS (A-1-1) 1976

	NAME	OWNER	RIND	CLASS	D.V.T.	G.T.	Exp	B	D	ENGINE (HP)
1		BPP Eg. Priok	Tug Boat	EU	-	55	16	4.5		200
2		Lonaga Penile	Coaster 200 Ton	EU	-	200	34.7	6.8		300
3		P.T. JANK (I)	Coaster 750 DWT	EU	-	770	59.5	10.4		1050
4		P.T. JANK (II)	Coaster 750 DWT	EU	-	770	59.5	10.4		1050
5		BPP Pasjaneasin	AS-10-11 607	EU	-	-	12.5	3.35		150
6		Adiguna Shipyard II	Cargo Barge 400 Ton	EU	-	400	33	8.4		-
7		BPP Surabaya	PS-10-1 606	EU	-	-	10.24	5		750
8		BPP Surabaya	PS-10-1 607	EU	-	-	10.24	5		750
9		BPP Tranjung priok	Tug Boat	EU	-	55	15	4.5		200

NEW SHIPBUILDING RECORDS (A-1-2) 1976

NET ROLL STEEL WEIGHT	PRICE	COST	CONSTRUCTION SCHEDULE				CONSTRUCTION PERIODS					DESIGN PER-HOURS	
			Contract	Launching	Keel Laying	Delivery	Start	End	Start	End	Start		
18,515.9			-	1976-6-2	1976-2-27	1976-2-5							
136,875.			1975-2-19	1976-10-11	1976-8-9	1977-2-3							
525,068.			1975-3-21	1976-9-6	1975-9-12	1976-12-31							
530,750.			1975-10-18	1976-9-12	1975-11-1	-							
24,113.9			-	1975-12-22	1975-8-13	1976-5-13							
21,000.			-	1976-4-15	1975-10-25	1976-2-28							
-			-	1975-8-20	1975-12-4	1976-10-25							
187,887.			1975-11-17	1976-9-1	1975-12-4	1976-10-25							
43,514.9			-	1976-1-2	1977-2-27	1976-2-5							

(12) SHIP REPAIRING RECORDS (B-1-1) 1976

more than Rp 1,000,000 only

NO	NAME	OWNER	RIND	CLASS	D.V.T.	G.T.	Ton	B	D	SALES (Rp1000)			COST	REPAIRING PERIOD	PERIOD IN BOOK
										ROLL WORK	MECHANICAL WORK	ELECTRICAL WORK			
1	TK.MP IV	PT. Stawel Sebeling	Roaring Boat	EU (A.S)		1900	40	10.7							
2	Ks. Kusantara utara	PT. Bui Fish Jkt	Fishing Boat	EU (F.B)		100	28	6.5			2,400		37	17	
3	Ks. Arjo Arjo	PT. Riko Mitra Jkt	Cargo	EU (A.S)		100	24.3	5			1,750.		35	-	
4	Ks. Sandera 17	PT. Perik San Besar	Fishing Boat	"		115	28.7	5.9			2,500.		33	8	
5	Ks. WS Paju	PT. R.S Fish Jkt	"	"		100	28.37	6.5			2,500.		31	11	
6	-	Bikjan perikanan	"	"		90	24.15	5.8			3,500.		40	10	
7	Ks. Maragal	PT. Paprofia	Cargo	"		-	34.6	6			2,680.		60	15	
8	Ks. Palivis	PT. Paprofia	"	"		-	34.6	6			3,500.		9	5	
9	Ks. Kustilan	PT. Paprofia	"	"		53	31.58	5.5			3,500.		9	5	
10	Ks. Sandera II	PT. Perik San Besar	"	"		-	23.8	5.9			3,500.		14	7	
11	Ks. Senarang W	PT. Sng cold St	Fishing Boat	"		100	25.8	4.8			2,500.		-	-	
12	Ks. Senarang VII	PT. Sng cold St	Fishing Boat	"		100	30.19	5.8			1,500.		30	10	
13	Ks. Rina Sata	PT. Schar sail	Cargo	"		202	32.37	7.7			1,750.		27	9	
14	Ks. Kaperall	PT. Petel	Tug Boat	"		-	11	5.1			3,000.		14	7	
15	Ks. Jalal Bahran	CE Trans Jkt	Cargo	EU (F.B)		-	30	6.4			1,750.		31	-	

Note: (A.S) Annual Survey (S.S) Special Survey (F.B) Fire Boat

SHIP REPAIRING RECORDS (8-2-1) 1976

NO	NAME	OWNER	TYPE	CLASS	D.V.T.	G.T.	TON	B	D	SALES (Rp1000)			COST	REPAIRING PERIOD	PERIOD IN DOCK
										MECH WORK	MAINTENANCE	ELECTRICAL			
16	KR. Surodoro 08	PT Parik San Bes	Fishing Boat	KR/BAI(A.S)		113.86	27.62	5.9							
17	KR. D'ang no.5	PT West Irian Fish	"	"		100	30.33	5.31							
18	KR. ADRI 271	PT Pang Tuan Sky	Cargo	BAI(A.S)		250	50	8.22			4,000.		26	16	
19	KR. D'ang no.6	PT West Irian Fish	Fishing Boat	KR/BAI(A.S)		100	30.33	5.31			7,000.		32	12	
20	TK. GL. 111	PT Garuda Lloyd	Barge	BAI(A.S)		91.64	30.65	5			9,000.		42	12	
21	TK. GL. 1111	"	"	"		110.82	30.65	5			7,000.		32	12	
22	KR. Surodoro 05	PT Parik San Bes	Fishing Boat	"		-	27.62	5			2,500.		-	-	
23	KR. D'ang 8	PT West Irian Fish	"	KR/BAI(A.S)		-	27.51	5.31			2,500.		13	6	
24	KR. D'ang 22	PT West Irian Fish	"	"		-	24	6.7			3,000.		60	15	
25	TK. AP-11	Perkanta Long Rang	Barge	BAI(A.S)		-					7,000.		40	10	
26	KR. Senarang 7	PT Sing cold St	Fishing Boat	"		100	25.8	4.8			5,000.		24	9	
27	KR. D'ang no. 21	PT West Irian Fish	"	KR/BAI(A.S)		150	24.55	6			4,000.		-	-	
28	KR. Toroni	Proy Pengerdian	Bredger	(F.B)		-	-	-			2,500.		20	20	
29	KR. Anas no. 2	PT. Inaprod	Cargo	BAI(A.S)		100	34.31	5.4			1,173.		33	-	
30	TK. Bak B-1	Proy Pengerdian	Barge	"		100	23.2	5.8			5,000.		30	10	
											3,997.		43	18	

SHIP REPAIRING RECORDS (8-3-1) 1976

NO	NAME	OWNER	TYPE	CLASS	D.V.T.	G.T.	TON	B	D	SALES (Rp1000)			COST	REPAIRING PERIOD	PERIOD IN DOCK
										MECH WORK	MAINTENANCE	ELECTRICAL			
31	TK. Bak B-10	Proy Pengerdian	Barge	BAI(A.S)		100	23.2	5.8							
32	KR. Saropala	Proy Pengerdian	Bredger	(A.S)		-	25	6.6							
33	KR. D'ang no. 23	PT West Irian Fish	Fishing Boat	KR/BAI(A.S)		150	24.55	7			5,124.5		50	10	
34	KR. Senarang 111	PT Sing cold St	Cargo	BAI(A.S)		100	31	5.6			4,187.2		36	-	
35	KR. D'ang no. 26	PT West Irian Fish	Fishing Boat	KR/BAI(A.S)		157.53	27.8	6.9			4,000.		32	12	
36	KR. Senarang 11	PT Sing cold St	Cargo	BAI(A.S)		110.54	24.1	5.4			3,000.		80	20	
37	KR. D'ang no. 25	PT West Irian Fish	Fishing Boat	KR/BAI(A.S)		157.53	27.8	6.9			4,000.		16	8	
38	KR. Anas no. 1	PT. Inaprod	Cargo	BAI(A.S)		100	34.31	5.4			3,000.		45	15	
39	TK. G.L. 1111	PT. Garuda Lloyd	Barge	"		-	27.2	5.2			4,000.		22	10	
40	KR. D'ang 31	PT West Irian Fish	Fishing Boat	KR/BAI(A.S)		157.53	27.8	6.9			2,500.		40	10	
41	KR. Anas 3	PT. Inaprod	Cargo	BAI(A.S)		100	29.8	5.4			2,000.		34	7	
42	TK. Ujung	PT Jakarta Lloyd	Barge	"		-	25	4.8			4,000.		30	10	
43	KR. D'ang 28	PT West Irian Fish	Fishing Boat	KR/BAI(A.S)		157	27.8	6.9			7,000.		36	10	
44	KR. D'ang 27	PT West Irian Fish	"	"		157	27.8	6.9			3,500.		34	8	
45	KR. Anas 6	PT. Inaprod	Cargo	BAI(A.S)		157	27.8	6.9			4,000.		47	10	
											7,000.		20	7	
											7,000.		30	7	

SHIP REPAIRING RECORDS (8-4-1) 1976

NO	NAME	OWNER	TYPE	CLASS	D.V.T.	G.T.	TON	B	D	SALES (Rp1000)			COST	REPAIRING PERIOD	PERIOD IN DOCK
										MECH WORK	MAINTENANCE	ELECTRICAL			
46	TK. G.L. -2	PT Jakarta Lloyd	Barge	BAI(A.S)		-	26	5.2							
47	KR. Anas 7	PT. Inaprod	Cargo	"		157	27.8	6.9			3,500.		24	7	
48	KR. D'ang 30	PT West Irian Fish	Fishing Boat	"		157	27.8	6.9			7,000.		20	7	
49	TK. Djawi	PT Jakarta Lloyd	Tug Boat	BAI(F.B)		-	18.7	4.6			4,000.		20	7	
50	KR. Anas-036	Sya'Bandar Senarang	Patrol Boat	BAI(A.S)		-	15	4			2,250.		45	10	
51	TK. Kating 111	Sya'Bandar Senarang	Barge	"		157	27.2	5.2			2,250.		-	-	
52	KR. Anas 8	PT. Inaprod	Cargo	"		157	26	6.9			2,250.		32	10	
53	KR. Anas 10	"	"	"		157	26	6.9			6,000.		34	10	
54	TK. Ekan	PT Slamet Surling	Barge	"		-	23.64	6.25			6,000.		34	10	
55	TK. Galap	PT Jakarta Lloyd	Tug Boat	"		-	13.3	2.9			4,000.		27	7	
56	KR. Senarang 111	PT Sing cold St	Fishing Boat	"		100	30.19	5.8			1,000.		45	10	
57	TK. Angira V	PT. PEARL	Tug Boat	"		-	19.7	5.6			2,500.		42	12	
58	KR. Lang Kara	"	"	"		545	52.32	9.14			5,000.		32	10	
59	TK. Paganan Perkanta	PT Slamet Surling	Barge	"		350	34.5	9.7			6,000.		48	12	
60	KR. Senarang 11	PT Sing cold St	Fishing Boat	BAI(F.A)		118	24.1	5.4			2,000.		47	12	
											8,112.7		6	-	

SHIP REPAIRING RECORDS (R-S-1) 1976

NO.	NAME	OWNER	KIND	CLASS	D.V.T.	G.T.	LCA	B	D	SALES (Rp1000)			COST	REPAIRING PERIOD	PERIOD IN DOCK
										MAINT. WORK	MACHINERY WORK	ELECTRICAL WORK			
61	KL. Jakarta	PT. I. Jateng	Cargo	BAI (AS)		225	21,95	5							
62	KL. Pulau Rangat	Esti - AL	Baru	BAI (AS)		225	39,35	5,68							
63	KL. Pasia 3	PT. Jakarta Lloyd	Barge	BAI (AS)		100	25	5,2							
64	KL. Tasumir	CV. Misa Indah Para	Cargo	BAI (AS)		-	62,51	7,51	61	21.500,					
65	KL. Kawi Paras	PT. Schar Sari	Cargo	BAI (FR)		99	33,56	8,1	62	12.000,			106	16	
66	KL. Semarang III	PT. Sng. cold St.	Fishing Boat	BAI (AS)		15	11,45	3,5	63	6.000,			43	13	
67	KL. Semarang III	PT. Sng. cold St.	"	BAI (FR)		100	28	5,6	64	3.472,6			24	8	
68	KL. Cepak	PT. Jakarta Lloyd	Tag Boat	BAI (AS)		23	19,8	4,75	65	1.500,					
69	KL. Sedda	PT. Schar Sari	Fishing Boat	BAI (AS)		100	26,6	7,58	66	1.500,					
70	KL. Semarang III	PT. Sng. cold St.	"	BAI (AS)		100	24,1	5,4	67	2.000,					
71	KL. Binawal	PT. Bina Utama	Cargo	BAI (AS)		100	24,43	6,52	68	1.467,1			17	5	
72	KL. TL. 07	PT. Trilora Lloyd	Barge	BAI (AS)		100	25,77	5,1	69	2.000,					
									70	3.000,					
									71	1.500,					
									72	1.500,					

(13) SHIP FACILITIES

(1) BERTH & DOCK

NO.	NAME & TYPE	DIMENSION		MAX. SIZE OF SHIP				G.T.	D.V.T.	USE
		L (M)	B (M)	1 (M)	2 (M)	3 (M)	4 (M)			
1	Building Berth	65	16					500		B
2	Building Berth	50	12					1300		B
3	Building Berth	60	15					3000		B
4	Slipway Repair	65	12					750		R
5	Slipway Repair	30	7.8					100		R
6	Slipway Repair	30	7.8					100		R
7	Slipway Repair	30	7.8					100		R
8	Slipway Repair	30	7.8					100		R
9	Slipway Repair	30	7.8					100		R
10	Graving Dock	62	8.10					350		R

USE: Building (B), Repairing (R), Building & Repairing (B & R)

(2) CRANES

NO.	TYPE	MAX. LIFT LOAD	MAX. ELEVATION	MAX. REACH	NUMBER	LOCATION
1	H.C.	25			1	
2	O.H.C.	3			1	
3	O.H.C.	2			1	
4	H.C.	10			1	
5	P.C.	2			2	
6	Fork lift	130			1	
7						
8						
9						
10						
11						
12						

Type: Portal crane (H.C.) Over Crane (O.H.C.), Tower Crane (T.C.)

Local Lifting crane (L.L.C.) "L" = Ship Crane (S.C.) Mobile Crane (M.C.)

③ SHIP & SHOP

Stage & Shop	Area (sq') Total area		Slab area
	Shop area		
Shipbuilding			
Steel stock yard			
Fabrication shop			
Subassembly shop & yard			
Assembly shop & yard			
Grand assembly yard			
Block stock yard			
Berth & Dock			
Pipe shop	135x1		
Pipe stock yard			
Machinery shop	575x1, 510x1		
Carpenter shop	500x1		
Plater shop	675x1, 675x1 365x1, 365x1		
Electrical shop	32x1		
Painting shop			
Outfitting shop			
Rigging shop			
Iron & Casting shop			
Warehouse	5175x1		
Welding shop	288x1, 458x1		
Roofed loft	1350x1		
Drawing room	15x1		
Repairing			
Berth & Dock			
Roll shop			
Machinery shop			
Outdoors working area			
Stockyard			
Warehouse			
Overhaul			

④ MACHINERY & EQUIPMENT

EQ	TYPE CAPACITY	LOCATION	NUMBER
1	Sand Blasting 8sq/ea ²	1976 Plate Shop	2
2	Straightening Roll 6m	1982	1
3	Bending Roll 6m	1985	1
4	Profile Bending Machine 1 ton	1982	1
5	Plate Shear 12m	1985	2
6	Profile Shear	1985	2
7	Machine Press 75 ton	1985	1
8	Machine Turner 0.15 ton	1985	1
9	Pneumatic Chipping Chisel 7sq/cm ²	1976	2
10	"	1975	1
11	Drilling Machine 35cm	1985	1
12	"	1983	1
13	"	1986	2
14	Punching Machine 10m	1983	1
15	Planer 360m	1985	1
16	"	400m	1
17	Grinding Machine 250cm	1985	2
18	"	200cm	1
19	Ferrace 3-2		3
20	Working Table		2
21	Overhead Crane 3 ton		2
22	Welding Generator 600 A	1983	1
23	Welding Transformer 250 A	1978	32
24	"	250 A	15
25	"	250 A	10
26	"	250 A	18
27	Semi Automatic Welding Machine 200 A	1975	1
28	Welding Floor 300m ²		2
29	Acetylene Generator 10kg	1974	2
30	Automatic Cutting Torch		6
31	Cutting Torch		60
32	Cutting Floor 300m ²		3
33	Overhead Crane 3 ton		3
34	Pipe Bending Machine 50cm	1975	2

MACHINERY & EQUIPMENT

	TYPE CAPACITY	LOCATION	NUMBER	
35	Pipe Bending Machine 50cm	1974	Pipe Shop 1	
36	"	1975	" 1	
37	"	1976	" 1	
38	Grinding Machine 8'6"	1975	" 2	
39	"	1974	" 2	
40	Bending Table 400"		" 1	
41	Drill	60cm	" 1	
42	Working Table		" 1	
43	Borer		" 3	
44	Rock Saw 200m	1974	" 1	
45	Lathe	1985	Machinery Shop 1	
46	"	1982	" 1	
47	"	1985	" 1	
48	"	1985	" 1	
49	Turret Lathe	1975	" 1	
50	Radial Drilling Machine	1985	" 1	
51	Horizontal Milling Machine	1980	" 1	
52	"	1975	" 1	
53	Rolling Machine	1976	" 1	
54	Rock Saw 275m	1986	" 1	
55	Tool Grinding Machine 150cm	1985	" 1	
56	"	1974	" 1	
57	Grinding Machine 250cm	1983	" 1	
58	Surface Grinder 10cm	1975	" 2	
59	Portable Boring Mach 25" x 4"		" 1	
60	Overhead Crane 2 ton		" 1	
61	Circular Saw 450cm	1982	Carpenter Shop 1	
62	"	200cm	1974	" 1
63	Saw Mill 28cm	1985	" 1	
64	Band Saw		" 1	
65	Planing Machine 25cm	1985	" 2	
66	Sanding Machine	1973	" 1	
67	Drilling Machine	1973	" 1	
68	Sealing Machine for Tarpaulin	1983	" 1	
69	Drilling (Manual) 10cm	1975	Electrical Shop 1	

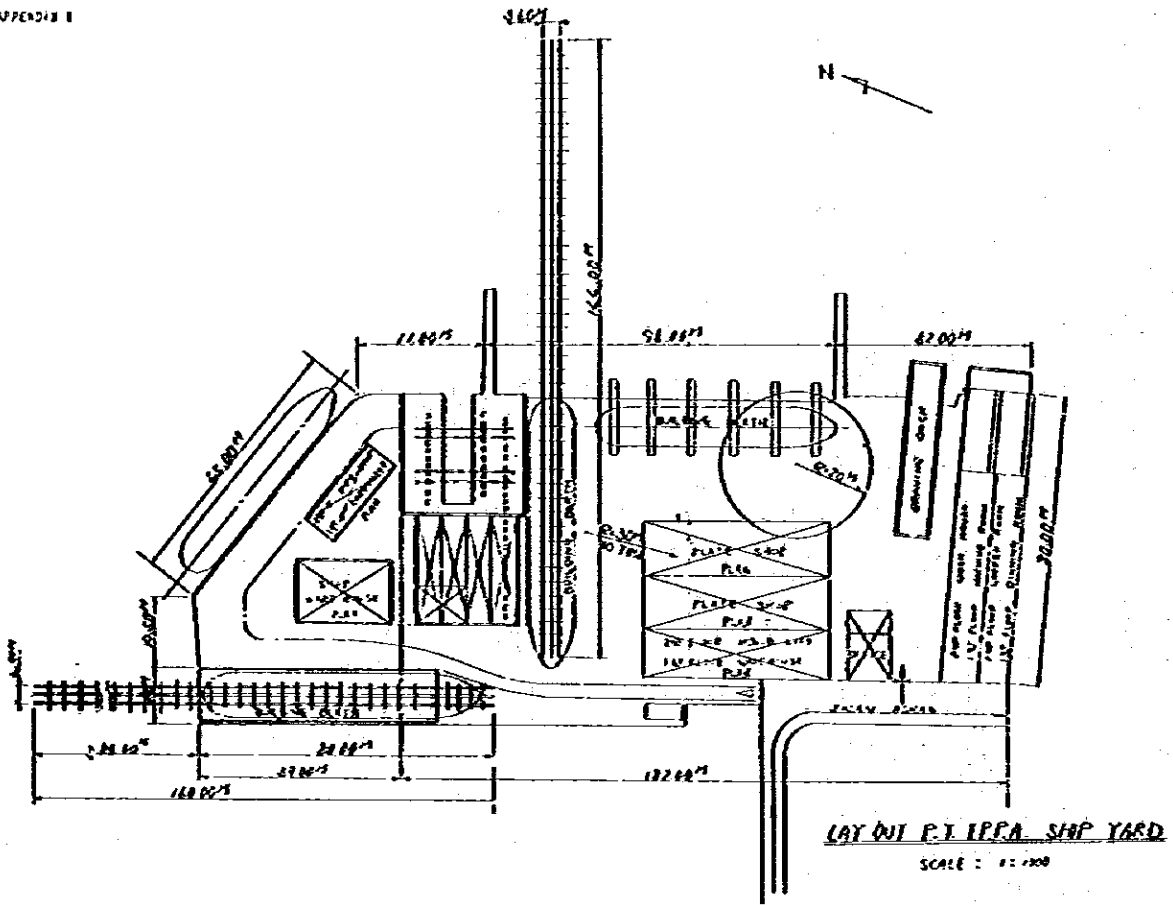
MACHINERY & EQUIPMENT

	TYPE CAPACITY	LOCATION	NUMBER
70	Battery Charger 24 Volt/4kg	1973	Electrical Shop 1
71	Drawing Floor 60 L x 15 B		Roofed Loft 1
72	"	20 L x 7 B	" 1
73	"	18 L x 12 B	" 1
74	Drawing Board (table) 2 L x 1 B		Drawing Room 10
75	Calculator		" 5
76	Planimeter		" 1

⑤ UTILITIES

Items	Capacity
Electric Power	P.L.V. 700 K.V.A. Generator 100 K.V.A.
Bricking & Industrial Water Facilities	Deep well 157/4kg Bricking & washing
Compressed Air Facilities	
Acetylene & Oxygen Facilities	Acetylene by Seattle and K.P.C. Oxygen 30-50 bottles/day
Water pollution Control Facilities	No
Others	No

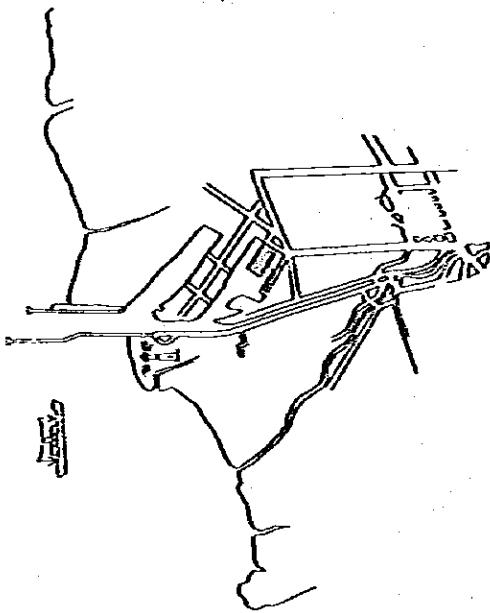
APPENDIX I



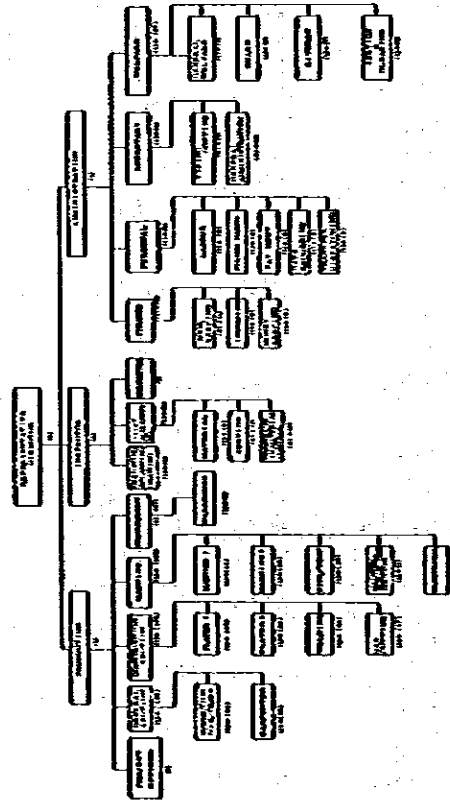
APPENDIX 2

IPPA KEMARANG

LAUT JAWA



APPENDIX 3



3. P. I. MENSA

1. General Situation

1-1. Introduction

This is an old shipyard located in the city of Tegal, Mid-Java. And has an approximate population of 700,000. MENSA shipyard is the fourth biggest heavy industry enterprise in this area. The city of Tegal is also famous as the home ground of casting industry conveniently situated near Barat to supply forging and casting materials, cylinders, etc.

P. I. MENSA is not only in shipbuilding but also in trading, but the trading division deals in only the parts used by P. I. MENSA and have no ship of its own. All the employees of MENSA are educated workers, and it is said that they take pride in wearing the working uniform marked with the firm name in the streets.

1-2. Topography

P. I. MENSA Shipyard is situated at the corner of Tegal Port, north of Tegal City. The shipyard is located near to the sands and face Java Sea.

In front of the shipyard there is a narrow canal of 5m across. The water depth of the canal is shallow, and average depth is 2.5m.

Accordingly, it is necessary to widen and dredge the canal preparing for future construction of new ships of 3,000 DWT or replacing. The range of tide is as small as 0.4m.

1-3. Building Facilities

1) Building Berths: For building new ship 5-2000T and 1-500 GT berths are provided, 500 GT berth is of concrete construction, and 200 GT berths are made by such simple method as just digging the ground in "U" shape giving a slight slope for launching.

Both berths are of the longitudinal type, Trolley launching is adopted because of the canal condition. Meanwhile, all the 200 GT berths are provided with roofs. It is convenient for shading rain and direct rays of the sun from the berths.

Reeve method may seem to be effective, but is not functional. On the other hand, transverse slip way type 200 GT berth is provided for repairing.

In case of pulling up the hull and launching the berth is moved up and down by means of 6 head wheels operated by 12 workers. It is quite difficult to widen the existing berths, because of narrow spaces around the berths.

2) Quay: Only quay of 60m length is provided beside 200 GT berths. At present repair ships come along-side the berths and repairing is carried out.

For the reason as above, it is very inconvenient and inefficient for carrying in heavy materials as well as construction operators.

3) Cranes: 1-20 T mobile crane is equipped which is used for loading steel materials onto the berths and carrying the main engines, as well as auxiliary machines and equipment.

Therefore, it is no exaggeration to say that the progress of work completely depends on this crane.

4) Workshops: Lumber mill, carpenter shop, machine shop, assembly shop, plater shop and casting and forging shop.

Sewing material wool to size is convenient and somewhat elastic and more economical than purchasing ladders of fixed size.

For the above reason, the lumber mill is large and provided with first class sewing machines.

The machine shop is provided with lathes, milling machines, boring machines and pipe cutters. Even in the case of building ships

of 3,000 DWT an overhead crane would be sufficient for operations. In assembly shop the fittings are assembled. The existing floor space is not sufficient enough for block construction system in future.

5) Work Shops: Marking, cutting and assembly are carried out at various places. That is, these work spots were not fixed in accordance with the flow of materials as the layout of this shop.

At present they take it a rule to carry out work at the site where the steel materials are stored indoors or outdoors. In case of outdoors, the work is carried out on the ground.

6) Welding Machines: Both types, generator type and transformer type are used. Most of welding machines of generator type are old and easy to get out of order.

By capacity, welding machines of 250 A are most widely used. In case of a small ship up to 200 GT under construction, the thickness of steel plate is about 5mm. Therefore, the existing welding machine will be sufficient for the above work.

In future, bigger size welding rods will be used because of increasing ship size. In above case, it is necessary to provide the welding machines of 500 A. Any automatic or semi-automatic welding machine is not used in this shop.

7) Gas Cutting Machines: The semi-automatic gas cutting machine is provided for long straight line cutting. Generally they depend upon manual cutting. It is recommended to use the semi-automatic gas cutting machines widely in order to improve quality and efficiency of work.

8) Electricity: So far as 50 KVA for lighting is concerned, they depend on commercial power supply, because municipal power supply is poor.

9) Water: Drinking water is purchased from municipal water supply for industrial use is pumped up from the deep wells, but it contains salt.

10) Oxygen and Acetylene Gas: Shipyard buys oxygen gas in bottles. Acetylene gas is generated using carbide.

1-4. Organization and Labour Force

Organization: Under General manager, the organization is classified into production and business departments. The production department is subdivided into 4 sections: Planning, Design, Hull and Engine and Berth and Repair, while the business department is subdivided into three sections, General Affairs, Accounting and Purchasing. It is recommended to put Planning under General manager as staff members.

That is, 15 chiefs and assistant chiefs subordinate to 3 managers and 235 workers are working under 15 chiefs and assistant chief. Organization as well as personal organization leave nothing to be desired. Remaining problem is how to arrange the shipyard.

In Design section, they seem to purchase drawings from outside. In order to attain smooth and efficient production, it is essential, for the first step, to make drawing precisely and functionally. Further improve and effort to be desired.

1) Working Hours: Working hours is 7:00 to 15:00 from Monday to Thursday, 6:30 to 13:00 on Friday and 7:00 to 12:00 on Saturday.

Weekly working hours is 38 hours. In order to promote work efficiency, it is necessary to take a rest at daytime and to carry down closing time to between 16:00 to 17:00 in summer.

For instance, building of the fishing boat of 370 GT started in March. And at the end of July the construction work of upper deck was hardly carried out. They said it takes as long as 3 days for carrying in the main engine. This is an unbelievable slow pace.

progress. There is a big difference in progress between finishing up one's work for the day and working in an off-and-on way.

- 2) Workers: Most of workers are of middle or advanced age and younger ones are few.

According to the employment conditions during the period of 1971 to 1977 reported by the 1st survey team, only about 10 workers were employed during the above period, the number of employees is as many as 235.

That is why most of workers are considerably aged.

1-5. Management Control

- 1) Building Instructions: After thorough discussion on features of ship, building period, remarks of specifications and assembly order, based on the specifications and the drawings, not only work efficiency can be measured but also the work will be carried out without any trouble or going backward. However, in case of ship under construction the upper deck was already erected before carrying in the main engine and the generator. Then, it is impossible to carry in the main engine and the generator without taking off the upper deck.

This is just an example of insufficient discussion on building instruction.

- 2) Progress Planning: Upon decision of the building instructions, the progress planning is fixed in accordance with the said instructions. Necessary components are prepared when necessary, and work is carried out true to building schedule, thus enabling to complete shipbuilding or repairing as scheduled. In PCNSA Shipyard the network of the general schedule is made considerably in detail.

Further effort to prepare the work schedule, and follow up of the schedule are desired.

- 3) Standards and Criteria: There are so many kind of work in shipbuilding procedure. For instance, marking method on steel plate or how to replace the propeller of a repair ship with new one should be carried out in accordance with respective tolerance and work standards which should be observed in the course of work progress.

Each worker can do good work after having through knowledge of the above standards and criteria. These standards and criteria have not yet prepared.

It is recommended to make work standards based on the oral statement made by well experienced skilled workers as well as the actual achievement data and rates.

- 4) Quality Control: Primarily quality control means self quality control. In many case an internal inspection system is necessary to check the quality of the parts because of unexpected troubles. At present only check is likely to be carried out by B1I inspectors. However, preparing for building ships of 1,000 DWT and up, it is necessary to establish a sufficient internal inspection system.

5) Technical level:

- (1) Welding: 4 workers were trained at JOC in banding and became skilful in horizontal welding of shell and butt welding.

Meanwhile, in case of welding ribs inboard and butt welding of upper decks, insufficient melting, over-lapping and uneven heats were observed.

It can be said that the skillness of the welders varies widely. It is recommended that young workers should be trained in accordance with training schedule making the best of their time to spare although no training centre is provided.

- (2) Gas Cutting Machine: Very few semi-automatic cutting machines are used. Most of gas cutting machines are of manual type.

The purity of acetylene gas generated with carbide and water may not be good. The roughness of kerf edge is not good. After cutting, touch up by something like grinding or by removing the sludge and ridges adhered along the cutting edge, is necessary.

1-6. Productivity

The exact productivity is not yet known because there was a big difference between the 1st survey reports and the secondary one.

At present, it seems that they do not lay emphasis on productivity so much, because the graphic charts of monthly amount of work dealt with and working hours, were just made at survey team's request.

However, it is absolutely necessary to make productivity clear. It is desired to correct data under firm conditions in future.

1-7. Subcontractors

This shipyard employs no subcontractors for both new shipbuilding and repairing work.

1-8. Design

This shipyard has a total of six design staffs in Tegal, and three in Jakarta. The Tegal office is staffed with four hull designers, one machine designer, and one electric designer, and the Jakarta office with one each designer of hull, machine, and electric. The Jakarta office is engaged in drafting such main drawings as B. A. lines, midship sections, etc.

1-9. Material Procurement

The main materials required for this shipyard in Tegal are transported from Jakarta. The transportation expenses are 4 Rp/kg, and do not seem to be a burden on the cost of business operation but the delayative term of delivery may handicap the production capacity.

As already mentioned, Tegal is the regional center of heavy industry, and the machinery, pumps, etc. nevertheless seem to be locally available.

111 QUESTIONNAIRE

1. General

- 1) Layout of shipyard (appendix 1) P.T. KERASA
- 2) Location and map (appendix 2) M. Kalimantan Tengah
- 3) Area: Area of premises 60,000 m²
Area of production "
- 4) Annual production capacity
New shipbuilding 3,000 B/V
Shiprepairing 9,600 B/V
- 5) Water depths: 25-3 m can be alongside 1000 B/V
- 6) Tides: 0.6 m difference
- 7) Currents: No
- 8) Depth of water low 2.5 m
- 2. Yard expansion plans: Yes
Building berth 1,700 B/V x 1
Graving dock 5,000 B/V x 1 In 1978

3. Organization and number

- 1) Tree diagram (appendix 3)
- 2) Number of employees for each rank
Director and manager 3 persons
Section chief and sub section chief 15 persons
Foreman and group chief 33 persons
Worker 135 persons
- 3) Planning structure of education
S.D. Elementary school (6 years) 148 persons
S.L.T.P. (S.M.P., ST ...) Secondary school (3 years) 57 persons
S.L.T.A. (S.M.A., S.T.A.) High school (5 years) 53 persons
AKADEMI College (3, 4 years) 4 persons
UNIVERSITY (4, 5 years) 4 persons
- 4) Annual supply of H.A. and workers

	1970	1971	1972	1973	1974	1975	1976	1977
H.A.	0	0	0	1	0	0	0	0
Workers	0	0	0	5	4	2	0	0

- 5) Overtime allowance for each hour
Working time: Mon-Thu 07:00-12:00, 13:00-15:00
Fri 06:30-11:30, 13:00-15:00
Sat 07:00-12:00 40 %/week

- 6) Ratio of annual salary up
Government rate
- 7) Welfare equipment
Doctor expense will be paid by company for all family.
Cloth supply two(2) overall/year
Shoes supply one(1) set/year
- 8) Meal supply
Lunch: Supplied Rp 150
Dinner: 12:00-14:00 Dinner rest. Meal will be supplied for more than three(3) hours overtime.

- 9) Traffic expense
No pay for workers who come from city inside
fully pay for workers who come from outside of city

- 10) Insurance
No
- 11) Safety for worker
Government rate
Medical examination twice/year
- 12) Training of worker
No training center
Jobs to training at Bandung held by Ministry of Industry
1975 two(2) welders for two(2) month
1976 " " " "

4. Subcontractor

- 1) Kind of skill:
Number of workers: No subcontractor
Wages:
- 2) Degree of skill
- 3) Number of company

5. Tools

- 6. Productivity
1) New Shipbuilding

a) Man-hour

	Type, Kind, B/V of Typical ships	Mill Weight	Man-hours (Mill Part)	Total Man-hour
I	1500 B/V Cargo	350 T	350,428 H	660,963 H
II	750 B/V Cargo & passenger	150	321,515	534,833
III	500 B/V Cargo	290	114,847	126,000

- b) Mill construction 230 hours/Ton
- c) Mill construction Rp 44,800 Cost/Ton
- d) Construction period
i) 1000 B/V, 750 B/V, 500 B/V Cargo, Cargo & passenger One(1) year

- 2) Ship repairing
a) Total gross tonnage per years 67/year
b) Total man-hours per years hour/year
c) Total sales amount per years /year
d) Man-hour/steel ton (In the case of steel replacement): 245 hour/ton
e) Rp 12,400 115 G/T Fishing boat
Rp 31,250 176 G/T Cargo --- include replacement of ten(10) ton steel plate
f) Rp 2,000,000
Rp 5,500,000 Cost/ship
g) Repairing period i) 115 G/T Fishing boat 10 days
ii) 176 G/T Cargo boat 20 days

7. Material procurement

Item	Purchase Price	Where Purchased from	Order-to Delivery Time	Stock Amount
Fe's Engine	Rp 145,000/HP Incl. Shaft & prop	Dutch	6 months	-
Generator	Rp 153,000/KVA	Tanner	"	-
Steel Plate	Rp 180/kg CIF JCI	Japan Sumitomo Through Parmanjaya	"	24 T
Profile	Rp 180/kg CIF JCI	"	"	2 T
Welding Rod	Rp 360/kg	Local	2 days	15 T
Paint	Rp 2000/l	"	"	30
Pipe	"	"	"	-
Wood	Rp 125,000/m ³	"	"	50

8. Design

- 1) Number of designers
Six(2) In Tegul Mill 4, Machine 1, Electric 1, Others 1
Three(3) In JIG. Mill 1, Machine 1, Electric 1
- 2) Drawing list
G.A. lines, ship section, piping, construction profile
electric wiring (See Appendix 4 : Drawing list)
- 3) Drawing method
- Pen
- 4) Photo copying machine
Blue printing machine

9. Construction techniques

- 1) Gas cutting work Manual gas cutting machine & Sem Automatic cutting machine
- 2) Welding work Manual welding machine
- 3) Sawing method Electro carbide 5 sets
Diesel 4 sets
- 4) Fitting work Pulling up using screw bolt
- 5) Marking work Hand chalk & hand marking

10. Points to be noted on shipbuilding & repairing

- 1) Design Sometimes get drawing from outside
- 2) Material procurement Import material delay
- 3) Construction Revision request by owner causes some trouble in construction stage.
- 4) manpower shortage No trouble
- 5) Unsatisfactory quality Scattered welding bead will be repaired without enough grinder
No annealing ferrace after welding
No good yard transportation causes schedule behind
- 6) Schedule behind
- 7) Inspection trouble
- 8) Others i) City electric power short
ii) Water from deep well has salt, fresh water cleaning of shell plate much expensive

11 NEW SHIPBUILDING RECORDS (A-1-1) 1976

	NAME	OWNER	KIND	CLASS	D.V.	G.T.	Opp	B	D	ENGINE (HP)
1	KR. SIAK IB	DEPERLA	Booy vessel	Kapal Perikanan	60	90	20	5.40	2.50	300
2	PELANGUNG RUMAHING	DEPERLA		-	-	-	-	-	-	
3	R.N. BINTANG 23	FEATER	COASTER	B.R.T.	200	175	32.50	6.80	2.50	300
4	R.N. BINTANG 24	FEATER	COASTER	B.R.T.	200	175	32.50	6.80	2.50	300
5	R.N. NIAGA III	P.T. JAKA	CARGO	B.R.T.	500	1100	55.00	10.40	6.30	1500

NEW SHIPBUILDING RECORDS (A-1-2) 1976

	NET TONNAGE	PRICE (Rp1000)	COST	CONSTRUCTION SCHEDULE			CONSTRUCTION PERIODS				DESIGN PERIOD		
				Keel Laid	Keel Laying	Start	RTI Deliv.	RTI Erect.	RTI Disch.	Acc. Disch.		Effect. Disch.	Paym.
1		80.000,000	70.000	1975	Mar. 1976	Sep. 1975	Mar. 1976		54.005		3.451	6.301	7.087
2				1976									
3		136.000,000	123.735	1976	Dec. 1975	Apr. 1976	Jan. 1977		56.806		8.726	5.429	6.152
4		136.000,000	123.735	1976	Dec. 1975	Apr. 1976	Jan. 1977		55.374		8.000	5.324	5.958
5		560.000,000	9.339	1975	Sep. 1975	Sep. 1975	Feb. 1977		7.224				585

12 SHIP REPAIRING RECORDS (B-1-1) 1976

	NAME	OWNER	KIND	CLASS	D.V.T.	G.T.	Opp	B	D
1	BIRANTARA	SUPA. Tegat	Fishing Boat	BKI (SS)	60	95	18	5	270
2	SARI SANGORA S3	PTSS. Senarang	"	"	60	115	24	7	3.0
3	MUTIARA II	SUPA. Tegat	"	"	60	90	13	5	250
4	SARI SANGORA S1	PTSS. Senarang	"	"	60	115	24	7	3.0
5	MUTIARA III	SUPA. Tegat	"	"	60	90	18	5	2.5
6	ZARA II	SUPA. Tegat	"	"	60	90	18	5	2.5
7	KEKUP II	SUPA. Tegat	"	"	60	90	18	5	2.5
8	MUTIARA II	SUPA. Tegat	"	BKI (SS)	60	90	12	5	2.5
9	MARSA II	PT. Patta Parak	Cargo	BKI (AS)	200	175	32	6.0	3
10	SARI SANGORA S2	PTSS. Senarang	Fishing Boat	BKI (SS)	60	115	24	7	3
11	SARI SANGORA S4	"	"	BKI (AS)	60	115	24	7	3
12	SARI SANGORA S5	"	"	"	60	115	24	7	3
13	KEKUP III	SUPA. Tegat	"	"	60	90	18	5	2.5
14	TAMERANG JAYA	PT. MARSA B. Patta	Cargo	BKI (SS)	200	175	32	6.0	2.8
15	REKAS II	SUPA. Tegat	Fishing Boat	"	18	15	18	4	2.0

NOTE AS ANNUAL SURVEY
SS SPECIAL SURVEY

SHIP REPAIRING RECORDS (B-1-2) 1976

	SALES (Rp1000)			COST	REPAIRING PERIOD	PERIOD IN DOCK	EXPENSES		
	FULL YEAR	MACHINERY WORK	ELECTRICAL WORK				FULL YEAR	MACHINERY WORK	ELECTRICAL WORK
1		1500			9	7			
2		3000			9	7			
3		1500			9	7			
4		3000			9	7			
5		1500			9	7			
6		1500			9	7			
7		1500			28	14			
8		1500			9	7			
9		6000			21	14			
10		3000			39	25			
11		3000			9	7			
12		3000			9	7			
13		1500			21	14			
14		1500			21	14			
15		100			9	7			

SHIP REPAIRING RECORDS (R-2-2) 1976

	NAME	CYCLE	RIND	CLASS	D.V.T.	G.T.	Exp	B	D
16	TUNA II	SIMP. Repair	Fishing Boat	BCI (AS)	60	90	18	5	2.20
17	MUTAMA V	SIMP. Repair	"	"	60	90	18	5	2.20
18	TK VERITY	TK VERITY	"	BCI (SS)	250	200	36	8	3
19	TK MORGAN	TK MORGAN	"	"	250	200	36	8	3
20	TK JOAN	TK JOAN	"	"	250	200	36	8	3

SHIP REPAIRING RECORDS (R-2-2) 1976

	SALES (\$21000)			COST	REPAIRING PERIOD	PERIOD IN DOCK	MAN-HOURS		
	HAUL WORK	MACHINERY WORK	ELECTRICAL WORK				HAUL WORK	MACHINERY WORK	ELECTRICAL WORK
16		1500			3	7			
17		1500			3	7			
18		500			7	7			
19		500			7	7			
20		500			7	7			

13 TAPP FACILITIES

① BERTH & DOCK

NO.	NAME & TYPE	DIMENSION		MAX. SIZE OF SHIP				G.T.	D.V.T.	USE
		L (ft)	B (ft)	Exp (ft)	B (ft)	D (ft)	W (ft)			
1	Building Berth	60	13					1000		B
2	Building Berth	60	8					200		B
3	Building Berth	60	9					200		B
4	Building Berth	60	7					200		B
5	Building Berth	60	8					200		B
6	Building Berth	60	9					200		B
7	Slipway Repair	50	15					200		B

B - Building (B), Repairing (R), Building & Repairing (BR)

② CRANES

	A TYPE	MAX. LIFT LOAD	MAX. ELEVATION	MAX. REACH	ROCKER	LOCATION
1	O.C.	20 Ton			1	
2	O.H.C.	5 Ton		Span 50 ft	1	Water Stop
3	Fork Lift	3.5 Ton			1	
4	JACK	2.5 Ton			1	
5	JACK	2 Ton			3	

Type: Portal crane (O.C.) Over Crane (O.H.C.), Tower Crane (T.C.)

Level Lifting crane (L.L.C.) = L = Slings Crane (L.C.) Mobile Crane (M.C.)

③ YARD & SHOP

Stage & Shop	Area (sq)		
	Total area	Shop area	Yard area
Shiplighting			
Steel stock yard	1250		
Fabrication shop	300	300	
Sub-assembly shop & yard	300	300	
Assembly s-op & yard	200		
Grand assembly yard			
Block stock yard			
Berth & Dock			
Pipe shop	50	50	
Pipe stock yard	150		
Machinery shop	250	250	
Carpenter shop	1320	1320	
Plater shop			
Electrical shop	25	25	
Painting shop			
Outfitting shop			
Rigging shop			
Iron & Casting shop	100	100	
Warehouse	terrup x 2 terbuka x 3		
Welding shop			
Weld. hole	250x1, 200x1	250x1, 200x1	
Drawing room	55	55	
Repairing			
Berth & Dock			
Roll shop			
Machinery shop			
Outdoors working area			
Stockyard			
Warehouse			
Overhaul			

MACHINERY & EQUIPMENT

	TYPE CAPACITY		LOCATION	NUMBER	
35	Turret lathe	200mm	1970	Machinery Shop	1
36	"	200mm	1971	"	2
37	"	100mm	1970	"	1
38	"	100mm	1963	"	1
39	Precision lathe	75mm	1970	"	1
40	Vertical Drilling Mach	1m	1970	"	1
41	"	2m	1970	"	1
42	"	3m	1972	"	1
43	Horizontal Drilling Mach		1970	"	1
44	Table Planer	3m	1970	"	1
45	Boring Machine (portable)		1974	"	1
46	Press	200 ton	1970	"	1
47	Rock Saw	150mm	1970	"	1
48	Tool Grinding Machine	50%	1970	"	2
49	Grinding Machine	30%	1974	"	1
50	Surface grinder	30%	1975	"	1
51	Portable Boring Mach			"	1
52	Overhead crane	10 ton		"	1
53	Wood lathe	25x30m	1946	Carpenter Shop	1
54	Circular Saw	200mm	1961	"	1
55	Saw mill	100cm	1963	"	1
56	Band saw	30cm	1968	"	1
57	Planing mach	60%	1963	"	3
58	Drill	25%	1975	"	2
59	Sanding mach		1964	"	1
60	Drying chamber	270m ³		Iron & Casting Shop	1
61	Castiron melting furnace	0.5 ton		"	1
62	Non ferrous melting furnace	0.5 ton batch		"	1
63	Drilling (manual)	3/4m	1970	Electrical Shop	3
64	Battery Charger	21 Volt/25 Amp	1960	"	1
65	"	12 Volt/25 Amp	1960	"	1
66	Latel gader	50x150 ²		Weld. hole	1
67	"	25x70 ²		"	1
68	Peja gader	2x1		Drawing Room	6
69	Resin cetak gader			"	1

④ MACHINERY & EQUIPMENT

NO	TYPE CAPACITY		LOCATION	NUMBER	
1	Sand Blasting	max. 120 Pel	1972	Plater Shop	1
2	Profile bending rack		1970	"	2
3	Plate Shear			"	1
4	Roller press	200 ton	1970	"	1
5	Pneumatic Chipping chisel		1970	"	2
6	Planer		1963	"	1
7	Grinding Machine	120mm	1970	"	1
8	"	120mm	1970	"	5
9	Furnace	12x2		"	1
10	Working table	5m ²		"	2
11	Travelling Overhead Crane	5 ton		"	1
12	Welding Generator	350 Ampere	1970	Welding Shop	11
13	"	200 Ampere	1975	"	20
14	Welding transformer	300 Ampere	1972	"	13
15	"	275 Ampere	1970	"	1
16	Welding Converter	350 Ampere	1970	"	10
17				"	
18	Welding floor	375m ²	1963	"	1
19	Acetylene generator	5kg		"	-
20	Semi Automatic Cutting Torch			"	1
21	Cutting Torch			"	20
22	Cutting floor	375m ²		"	1
23	Pipe bending rack	ø100mm	1970	Pipe Shop	1
24	Pipe bending rack	ø250mm	1973	"	1
25	"	3m	1976	"	1
26	Grinding rack		1970	"	3
27	Bending table	12x2		"	1
28	Drill	2m	1969/1970	"	6
29	Working table	3m ²		"	3
30	Burner			"	5
31	Rock saw	150mm	1970	"	1
32	"	200mm	1977	"	1
33	Thread Cutting rack	ø250mm	1970	"	2
34	Triangle penaras	12x2		"	1

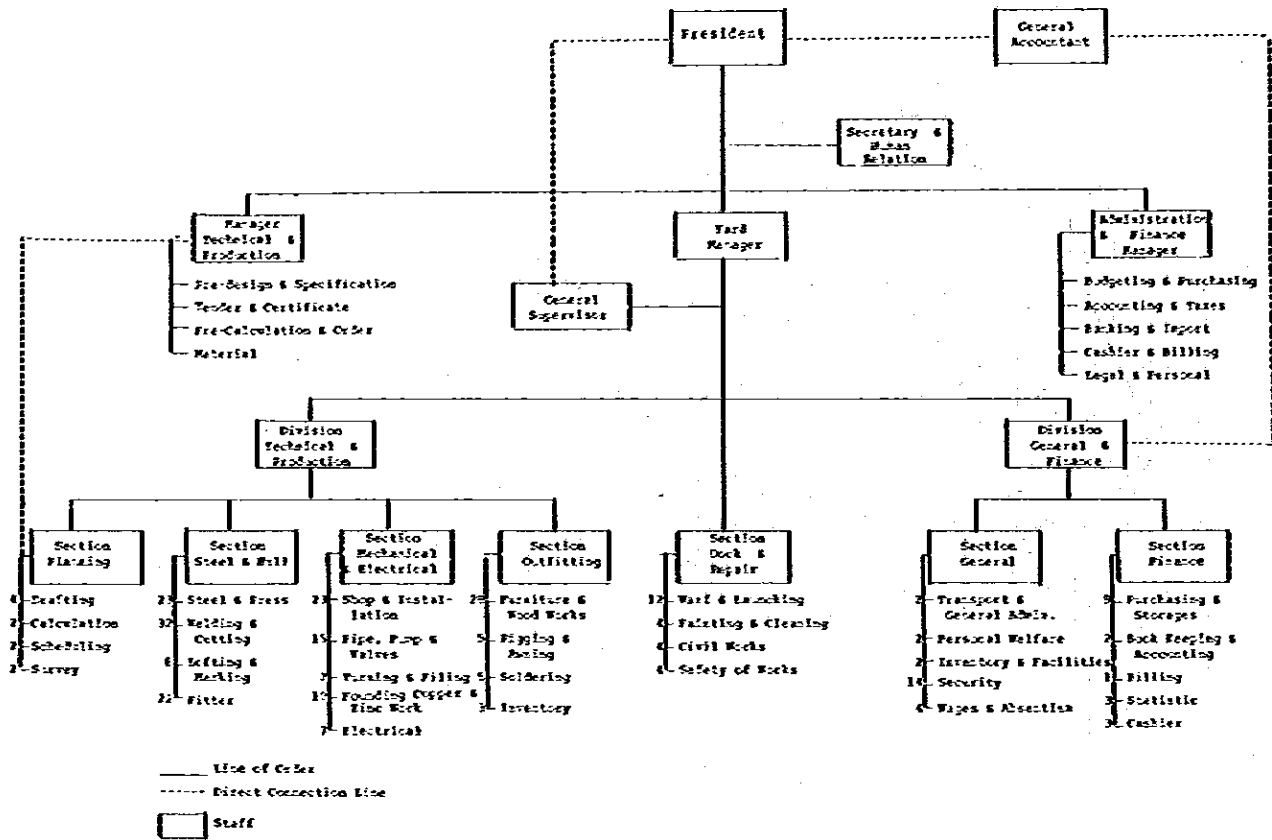
MACHINERY & EQUIPMENT

	TYPE CAPACITY	LOCATION	NUMBER
70	Resin Bling	Drawing Room	2
71	"	"	2
72	Planimeter	"	3

⑤ Utilities

Item	Capacity
Electric Power	P.A.T. 50 K.V.A. for lighting only Generator 150 K.V.A. (GASER) 150 K.V.A. (C.307A) 100 K.V.A. (C.307A)
Bricking & Industrial Water Facilities	Deep well for industrial use City water for drinking
Compressed Air ⁺ Facilities	no(2) portable compressor
Acetylene & Oxygen Facilities	Use C.P.G. 0.5 Bottles/dry Oxygen 400 Bottles/Week Carbide 10 kg/day
Water pollution Control Facilities	No
Others	No

ORGANIZATION CHART IN P. T. MENASA



ANNEX 4: DRAWING LIST

- Principal Particulars of Hull Part
- General Arrangement
- Lines
- Hydrostatic Curves
- Capacity Plan with Deadweight Scale
- Results of Deadweight Measurement Test
- Trim and Stability Data
- H10 SHIP SECTION
- Construction Profile
- Shell Expansion
- Stern Frame
- Boiler
- Diagram of General Piping
- Diagram of Cargo Oil, Sludge and Ballast Lines
- Fixed Foam Fire Extinguishing System
- Tank Sounding Table
- Pipe Arrangement in Main Pump Room
- H100 Control Plan
- Diagram of Inert Gas System

1. General Situation

1-1. Introduction

This shipyard was established as early as in September, 1910, and registered as N.V. Droogdok-Maatschappij in Amsterdam. From the year 1942 to September, 1945, it was ruled by the Japanese army under the name of "Marine-Dockyard", but simultaneously with the end of World War II, restored as N.V. Droogdok-Maatschappij. In 1958, it came under the state control of the Indonesian government, and then became a government enterprise under the name of P.N. Dok dan Perkapalan "Surabaya" in 1961. After merging "Sukor Shaita Shipyard", a small shipyard situated to the north of this P.N. Dok dan Perkapalan, in 1963, it restarted as a private enterprise (P.T.) in 1976.

The business turn-out recorded from the year 1971 to 1975 is only 4 to 5 coasters or larger. The two 2500 T.L.C. floating docks constructed 1974 to 1976 for a private use of its own were the first big construction not only to this shipyard but also to Indonesia. This remarkable success indicated the level of their production technique both domestically and internationally.

The actual business turn-out of ship repairing recorded in the year 1976 was 73 ships.

1-2. Conditions of Location

This dockyard is located on the east corner of the port facing Perak in Surabaya, one of the most important cities in the island of East Java. The port facing Perak is thus situated in Surabaya, the local center of administration and economy, and has the industrial area of East Java as its hinterland.

The area of the shipyard lies in the shape of 'L', and the north side faces the harbor. The water depth around the mooring quay is 6.2 meters, and in front of the slipways 3.9 meters. The water depth in front of the hoisting berths in Sukor Shaita yard is as shallow as 2 meters.

1-3. Shop Facilities

This shipyard has one shipbuilding berth each of 1500/8, 1000/8, and 1500/8, and two horizontal hoisting slipways of 200 T.L.C. As for the floating dock, it owns one 400 T.L.C. and two 2500 T.L.C.'s.

Steel fabrication shop, the machine shop, etc. have enough floor space, and arranged quite satisfactorily. The machinery equipped there, however, is partially new and mostly old.

The shipyard employs a total of seven overhead cranes (O.H.C.) ranging from 1.5t to 15t, and of eight tower cranes or portal crane ranging from 3.5t to 15t.

The carpenter shop of this shipyard is neatly arranged, and especially the centralized stock collector is wonderful. It is making the working environment much better.

The machine shop owns as many as 42 lathes of various sizes. Most of the machinery equipped here was once being used for the other purposes than for shipbuilding when this shipyard was widely engaged in general construction work. So the working capacity is a little unbalanced as shop machines for shipbuilding.

1-4. Organization, Employees, and Labour Condition

Two managers respectively supervising the production division and the administration and finance division are under the control of general manager. The production division has three te-

chnicians of planning and design, production planning control, and production.

The administration and finance division has four departments of commercial, finance and book keeping, personnel, and south yard. These departments have a total of four managerial staffs supporting the manager, and two others are stationed in Jakarta office.

Two each of shipbuilding engineers were newly employed in the year 1975 and 1976, and one in the year 1977. The number of workers newly employed in the year 1977 is 40. The regular work hours per week are 38. The allowances for overtime work and the annual increase in salary are subject to their own tariff.

1-5. Production Management and Workmanship

Various kinds of management data are put up on the walls of the conference room in this shipyard. But these data clearly show the past business turn-out, and do not seem to be playing an important role in their future planning. The ship now under building in this shipyard is only one small-sized pilot boat. Probably for this scanty of work, the inside of the shipyard is neatly arranged and kept in order.

This shipyard owns three units of automatic cutting machine and two units of gas cutting machine, and is trying to enhance the quality and working efficiency. As for the hull construction, it has adopted a block construction system and is technically leading the shipbuilding industry in Indonesia by making full use of the sufficient facilities.

It also has excellent technique in wood work, and has an experience of building wooden lifeboats domestically.

1-6. Production Efficiency and Term of Work

The average man-hours for hull building are 2000/ton, and for repairing work 5500/ton. As for the term of hull building work, the record says that one coaster of 1500/8 took one year, and another took one year and five months. The number of ships repaired in this shipyard in the year 1976 is 73, and most of them required more than one month of repairing term. Some of them are said to have required 3 to 4 months.

1-7. Subcontractors

This shipyard is now employing eight different kinds of subcontractors for machinery installation, hull assembly and welding, piping, painting work, etc. The average number of these workers belonging to the subcontractor is 400. In the case of steel material replacement work, 60% of the amount claimed from the client shipowner is paid to the subcontractors. The technique of these subcontractors is satisfactory.

1-8. Design

This shipyard has a planning and design department, and this department is staffed with 11 hull designers, 2 mechanical designers, and 4 calculation experts.

1-9. Material Procurement

The main engines, auxiliary machines, steel materials, rolling rolls, pipes, etc. are all imported directly through agents. The term of delivery is 4 to 5 months after placing the order. Only the paints and wood materials are locally procured, and the term of their delivery is about one week.

III QUESTIONNAIRE

1. General

- 1) Layout of shipyard (Appendix B) P.T. BOK & REKAPALAN SURABAYA
- 2) Location and map (Appendix C) JL. 16 PERAK BARAT SURABAYA
- 3) Area: Area of premises 57,000 m²
Area of production 57,000 m²
- 4) Annual production capacity
New shipbuilding 1,750 B/W
Shiprepairing 52,600 B/W
- 5) Water depth: 4 m
- 6) Tides: Difference ab. 2 m
- 7) Current: No

2. Yard expansion Plans: No

3. Organization and number

- 1) Tree diagram (Appendix D)
- 2) Number of employees for each rank

Director and manager	10 persons
Section chief and sub section chief	9 persons
Foreman and group chief	persons
Worker	persons
- 3) Ranking structure of education

S.D.	Elementary school (6 years)	570 persons
S.L.T.P. (S.M.P., ST ...)	Secondary school (3 years)	160 persons
S.L.T.A. (S.M.A., S.T.M.)	High school (3 years)	156 persons
AKADEMI	College (3, 4 years)	15 persons
UNIVERSITY	(4, 5 years)	14 persons

4) Annual supply of R.A. and workers

	1971	1972	1973	1974	1975	1976	1977
R.A.	No	No	No	No	2	2	1
Workers	"	"	"	"	0	0	50

5) Overtime allowance for each hour

Working time	Mon-Thu	Fri	Sat	According to the tariff
07:00-15:30				1 hour for lunch rest
07:00-11:00				
07:00-12:00				35 %/week

6) Ratio of annual salary up

Salary consist of basic salary and family allowance, amount of salary up calculated according to the tariff.

7) Welfare equipment

Tennis court, Volley Ball court, Badminton court

8) Meal supply

Lunch: Mon-Thu at 11:30, for working hour up to Fri 16:00
Dinner: Mon-Sat: for working hour up to 21:00 at 18:00
overtime meal 75% will be paid themselves

9) Traffic expense

Included in salary, Rp 7500, 5000, 3000/month

10) Insurance

workers only, up to age of 55 years

11) Safety for worker

Government rate

12) Training of worker

1977, trained 60 workers requested by PAFK after trained BOK employed 60 workers

4. Subcontractor

1) Kind of skill:

Number of workers: Fabricary 50, Plate welding 250, Pipe 25
Scrape & paint 75 in average
Plate job: Rp 220/kg x 0.6
(including material & labour)
P.N. BOK sales amount

2) Degree of skill

Good

3) Number of company

Eight (8) companies
Plate 7, Pipe 3, Wood 2, Rack 2
Scrape & paint 2

5. Tools

1) Size of tool store

2) Main tools

- a) Air
- b) Electric
- c) Hydraulic
- d) Hammer, sander, etc.

6. Productivity

1) New Shipbuilding

a) Pan-hour

	Type, kind, B/W of typical ships	Unit Weight	Man-hours (Nett Part)	Total Man-hour
I	Cargo 500 B/W	330 T	175,000 H	250,000 H
II	Cargo & pass 750 B/W	853	215,000	350,000
III	Tug boat 550 HP	60	70,000	100,000

b) Mill construction 320 hour/ton

c) Mill construction 224,000 Cost/ton

d) Construction period

- i) Self propelling Barge Four (4) months
- ii)

2) Ship repairing

a) Total gross tonnage per year: 1976 60,000 GT/year

b) Total man-hours per year: 1976 ab 3,055,331 hour/year

c) Total sales amount per year: 1976 Rp 1,500,000,000 /year

d) Pan-hour/steel ton (in the case of steel replacement): 555 hour/ton

e) Rp 25,000 Cost/ST

f) Rp 14.5 x 10⁶ Cost/ship

g) Repairing period i)

ii)

7. Material procurement

Item	Purchase Price	Where Purchased from	Order-to-Delivery Time	Stock Account
Main Engine	Rp 31,800/kg	Import	ab 5 months	-
Generator	"	"	"	"
Steel Plate	Rp 200/kg	"	4 months	700 Ton
Profile	Rp 150/kg	"	"	62 Ton
Welding Rod	Rp 500/kg	"	"	11.2 Ton
Paint	A/C Rp 1700/A A/T Rp 3200/A	Local	1 week	5.70
Pipe	Rp 2000 - 5000/m	Import & Local	4 months	11,000m
Wood Soft Teak	Rp 60,000/m ³ Rp 195,000/m ³	Local	1 week	58 m ³

8. Design

1) Number of designers Designer 15 Calculator 4

2) Drawing list

3) Drawing method - Pen

4) Photo copying machine

Yes

9. Construction Techniques

1) Gas cutting work

2) Welding work

3) Coupling method

4) Fitting work

Linear fitting method

5) Packing work

10. Points to be noted on shipbuilding & repairing

1) Design

No problem

2) Material procurement

Delay on import material

3) Construction

No problem

4) Manpower shortage

No problem

5) Unsatisfactory quality

No problem

6) Schedule behind

Sometimes, caused by drawing supplied by owner or import material.

7) Inspection trouble

No problem

8) Others

No problem

11 NEW SHIPBUILDING RECEIPTS (A-1-1) 1976

	NAME	OWNER	KIND	CLASS	D.W.	G.T.	Loc	B	D	ENGINE (HP)
1		ANANDA PERINTIS	Coaster	D.K.I.	500		56.0	9.0		600
2		P.T. FASE	Coaster I	D.K.I.	750		59.5	10.0		1050
3		PRAYEK PERABILI-EAST BOC SURABAYA	Tug	D.K.I.	-		21.0	5.8		400
4		P.T. FASE	Coaster II	D.K.I.	750		59.5	10.0		1050
5		P.T. CELISA GOR		-	20					-

NEW SHIPBUILDING RECEIPTS (A-1-2) 1976

NO	NET RAIL STEEL WEIGHT	PRICE (Rp.1000)	COST	CONSTRUCTION SCHEDULE				CONSTRUCTION PERIODS				RESIDUAL HOURS	
				Com. Eract.	Launch-Ing	Keel-Laying	Deliv-ery	WTE Fabr.	WTE Eract.	WTE Deliv.	Res. Deliv.		Eract. Deliv.
1		620.110		25-2-75	8-8-75	18-8-75	Apr. 76						
2		555.064		28-8-75	12-6-76	15-8-75	21-2-77						
3		63.304		23-6-75	18-6-76	Aug. 75	29-12-76						
4		530.750		16-10-75	10-9-76	9-12-75	-						
5		29.900					27-8-76						

12 SHIP REPAIRING RECORDS (B-1-1) 1976

More than Rp 1000 only

	NAME	OWNER	KIND	CLASS	D.W.T.	G.T.	Loc	B	D
1		Citra Indonesia	Bridge	-(AS)		650	45	15	2
2			-	-(AS)		300	30	8	3
3		Sancora Jaya Utama	-	BU(SS)		1739	83	12	2
4		P.T. Garuda	Cargo	BU(SS)		2213	82	13	12.1
5		Kusa Tenggara	-	BU(SS)		1637	82	10	4.3
6	Taratun		-	BU(SS)		1151	70	11.5	4.5
7	Batan		Tug	-(AS)		190	21.3	6.2	2.7
8	Sembilang	A.L.R.I.	-	-(AS)		250	52	6.2	2
9	B.D.P. III	Pertamina	Barge	-(AS)		290	24.3	9	3
10	Splitbarge S2	Pertamina	Barge	-(AS)		250	54	11	2.5
11	Parag Tenggara	A.L.R.I.	-	-(SS)		1700	78	11	3.1
12	Bayu	Sri Indrapura	-	BU(SS)		350	54	9	3
13	Tambak	Sri Indrapura	-	BU(AS)		534	50	8.8	4
14	Bek Titan	P.T.D.P.S.	Floating Crane	-(AS)		400	-	-	-
15	Selang	Selang Keraua	-	-(AS)		750	51	9	3.1

Note: (AS) Annual Survey
(SS) Special Survey

SHIP REPAIRING RECORDS (B-1-2) 1976

	SALES (Rp1000)			COST	REPAIRING PERIOD	PERIOD IN DOCK	HOURS		
	RAIL WORK	MACHINERY WORK	ELECTRICAL WORK				RAIL WORK	MACHINERY WORK	ELECTRICAL WORK
1		9233			57	12			
2		2760			34	12			
3		23464			103	11			
4		3587			22	8			
5		4302			23	6			
6		38015			70	13			
7		1607			28	13			
8		23218			78	38			
9		3575			70	30			
10		7365			14	7			
11		56410			106	14			
12		6070			118	24			
13		16920			127	35			
14		-			20	35			
15		21830			67	23			

SHIP REPAIRING RECORDS (B-2-1) 1976

	NAME	OWNER	KIND	CLASS	D.V.T.	G.T.	Lea	B	D
16	P.S. Saktosa	Pertalina	Tug	(AS)		350	65.5	12	4
17		Perk. A. Sufatratlan	Tug	(AS)		188	29	8	3.4
18	Splittarga 62	Pengerukan	Barge	(SS)		200	48	10	2.6
19	Katiman	Patel	Cargo	BAI (AS)		835	61	18.5	4
20	B.S. 84	P.T. BOK	Tug	- (AS)		100	-	-	-
21	Kangan	Sandera Jaya Utama	-	BAI (SS)		1757	77.5	12	5
22	Pa'a	Palsutra	-	BAI (SS)		500	51	9	4
23	Safira	Green Wincha	-	BAI (SS)		400	30	7	2.4
24	Silale	Pertalina	-	- (SS)		300	47	8	3
25	Borebon III	Borebon	-	- (AS)		509	43	8.6	4.4
26	Kalana	Sandera Jaya Utama	Cargo	BAI (SS)		1630	77.5	12	5
27			Cargo	BAI (AS)		350	40	7.6	2.6
28			-	BAI (AS)		291	38.5	7.4	3
29			Barge	- (AS)		50	23.4	8.2	2.8
30			Coaster	BAI (AS)		250	38	7	3

SHIP REPAIRING RECORDS (B-2-2) 1976

	SALES (Rp1000)			CASE	REPAIRING PERIOD	PERIOD IN DOCK	MAN-CURS		
	ALL WORK	MECHANICAL WORK	ELECTRICAL WORK				ALL WORK	MECHANICAL WORK	ELECTRICAL WORK
16		8645			54	23			
17		3630			50	19			
18		5530			20	10			
19		18216			18	2			
20		-			27	7			
21		11231			38	8			
22		15715			25	5			
23		15078			83	31			
24		9511			115	31			
25					14	7			
26		26360			132	40			
27		5340			43	19			
28		2340			67	3			
29		4275			71	11			
30		5585			60	16			

SHIP REPAIRING RECORDS (B-3-1) 1976

	NAME	OWNER	KIND	CLASS	D.V.T.	G.T.	Lea	B	D
31	Patunglanya	Kalabu	-	BAI (AS)		292	39	7.4	3
32		Utma Jaya Sh.	Coaster	"		252	37	7.3	2.2
33	Paramarta	P.T. R.A.	Tug	"		50	22	6	2
34	Cipta	Tenggara	Coaster	"		222	40	7	2.7
35	Nifa Jaita	Pat. Sejati	Cargo	"		958	71	11	5
36	Ma'eo	Magrodim	Fishing Boat	"		288	43	5.6	4
37	Sandera 12	Pat. Sandera Besar	"	"		74	23.8	5.9	2.5
38	Sandera 15	"	"	"		74	23.8	5.9	2.5
39	Sandera 16	"	"	"		74	23.8	5.9	2.5
40	Teluk Nifa	Nusa Tenggara	Cargo	"		1132	65	10	5.3
41	B.A.P.P.	P.T. Gungita	Tug	"		190	30.4	5.4	2.1
42	Adirasa	P.N. Garas	Cargo	"		2213	82.18	13.43	7.1
43	Pas Rock	Nusa Bipa	"	"		1071	60	9	3.9
44	Merus III	P.T. Merus	Fishing Boat	"		30	25	6	2.5
45	Jerk	Pat. Seltra	Cargo	BAI (SS)		677	66	10.5	4

SHIP REPAIRING RECORDS (R-3-2) 1976

	SALES (Rp1000)			COST	REPAIRING PERIOD	PERIOD IN DOCK	PARTICULARS		
	HAUL WORK	MACHINERY WORK	ELECTRICAL WORK				HAUL WORK	MACHINERY WORK	ELECTRICAL WORK
31		5435			58	16			
32		4315			64	9			
33		18829			12	7			
34		1790			8	4			
35		6367			18	7			
36		2229			12	11			
37		2564			32	19			
38		3058			33	19			
39		2758			43	19			
40		6645			16	12			
41		3569			55	12			
42		35668			78	29			
43		1529			11	8			
44		3311			28	6			
45		11256			56	21			

SHIP REPAIRING RECORDS (R-1-1) 1976

	NAME	OWNER	KIND	CLASS	D.V.T.	G.T.	TON	B	D
46	Perastil		Cargo	(AS)		112	28	6.5	2.4
47	Jambangan	P.V. Saran	"	BAI (SS)		379	57	9	5.4
48	Landa	Petal	"	BAI (AS)		522	51	9	4
49	P.S. 3	Pertamina	Top	"		671	59	11.5	4.9
50	P.S. 18	Pertamina	"	"		671	59	11.5	4.9
51	Pudoratra	P.A.L.A.	Ferry	BAI (SS)		307	33.5	11.5	1.86
52	Rajaya	Pertamina	Top	(AS)		222	29	7	3
53	Perastil	Dkt. Raja	Cargo	BAI (SS)		315	43	7.6	3
54	Petaa Satonda	Rusa Tenggara	"	(AS)		310	41	7.2	3.2
55	Boto Ampangara	P.P.S.S.	"	BAI (SS)		116	55.5	9	4
56	Pikal	Pertamina	Top	(AS)		75	18	5	2
57	Fair Island	Pertamina	"	BAI (AS)		179	33.5	9.2	4
58	Stak	Pertamina	"	(AS)		115	27	7.55	2.4
59	P.P.S. 11	P.V. PA Surabaya	"	(AS)		60			
60	Rusa Toah	Dkt. Raja	"	BAI (SS)		379	43	7.6	3

SHIP REPAIRING RECORDS (R-1-2) 1976

	SALES (Rp1000)			COST	REPAIRING PERIOD	PERIOD IN DOCK	PARTICULARS		
	HAUL WORK	MACHINERY WORK	ELECTRICAL WORK				HAUL WORK	MACHINERY WORK	ELECTRICAL WORK
46		4530			75	21			
47		21921			52	26			
48		18301			43	32			
49		4485			35	15			
50		4425			35	15			
51		2335			8	4			
52		3354			29	18			
53		23145			83	33			
54		4248			18	15			
55		67413			133	52			
56		1583			36	14			
57		2523			67	14			
58		5812			42	26			
59		-			52	24			
60		9157			41	26			

SHIP REPAIRING RECORDS (8-5-1) 1976

	NAME	OWNER	KIND	CLASS	D.V.T.	G.V.	Sea	B	D
61	Tobelo	Pelal	Cargo	BKI(SS)		3235	96.3	11.5	4.5
62	Kajalalido	P.P.S.S.	"	BKI(SS)		813	59	9	1
63	M.P. 002	Bapel RT	Pilot Boat	(AS)		36	15.25	1.7	1.2
64	Anggadi W	DAPEI RT	Tug	(SS)		119	25	7	2
65	A. Mariale	P.T. Selangas Guna Batikpapan	"	BKI(SS) BKI(SS)		61	21	6.0	3.43
66	Yara	P.W. Garam	"	BKI(SS)		133	57	9	5.4
67	Palran	Gesuri Lloyd	Cargo	BKI(BA)		1194	29	19	2.2
68	Bogaran	Pelal	"	BKI(SS)		3235	96.3	11.5	4.5
69	Elipser	P.T. Ejptara'arja	"	BKI(SS)		270	46	7	2.8
70	Pulea Bikan	Elton Jaya Shipping	"	BKI(SS)		170	33.6	6.6	1.6
71	Aster	Samudra Pas Paya	"	"		318	42.5	7.6	2.57
72	Belora Jatin	Belora Kaltim	"	BKI(SS)		253	38.8	8.26	4.43
73	Ejptara'arja	Ejptara'arja	"	BKI(SS)		251	38.5	7.4	3
74	Seraya	Gongita	"	BKI(SS)		283	62.84	7.54	8.33
75	Sengala	Pertamina	Barge	(AS)		300	33.6	10.5	1.75

SHIP REPAIRING RECORDS (8-5-2) 1976

	SALES (Rp1000)			COST	REPAIRING PERIOD	PERIOD IN DOCK	REPAIRS		
	MECH WORK	MACHINERY WORK	ELECTRICAL WORK				MECH WORK	MACHINERY WORK	ELECTRICAL WORK
61		26112			19	14			
62		70713			52	43			
63		2888			29	29			
64		7743			35	21			
65		1118			18	5			
66		27550			52	43			
67		6066			21	38			
68		15587			33	29			
69		22174			113	73			
70		6526			183	36			
71		6059			39	26			
72		15335			190	72			
73		1125			45	1			
74		6681			45	36			
75		3602			25	16			

SHIP REPAIRING RECORDS (8-6-1) 1976

	NAME	OWNER	KIND	CLASS	D.V.T.	G.V.	Sea	B	D
76	Ejptara'arja	Ejptara'arja	Cargo	BKI(SS)		251	38.5	7.4	3
77	Itakel el	Green WinPa	Barge	BKI -		1422	66.7	9.7	4.9
78	Tg. Komuning	Risaya Nitra	Cargo	BKI -		290	26	5.8	2.15

SHIP REPAIRING RECORDS (8-6-2) 1976

	SALES (Rp1000)			COST	REPAIRING PERIOD	PERIOD IN DOCK	REPAIRS		
	MECH WORK	MACHINERY WORK	ELECTRICAL WORK				MECH WORK	MACHINERY WORK	ELECTRICAL WORK
76		1603			18	8			
77		3120			54	-			
78		4104			102	-			

13 YARD FACILITIES

① BERTH & DOCK

NO.	NAME & TYPE	L (M)	B (M)	Upp (M)	S (M)	D (M)	F (M)	G.T.	D.M.V.	B USE
1	BUILDING BERTH	81.0	10.0						750	B
2	BUILDING BERTH	87.0	12.0						1000	B
3	BUILDING BERTH	70.0	14.0						1500	B
4	SLIP WAY REPAIR	41.4	8.8					TLC 250		R
5	SLIP WAY REPAIR	42.4	8.8					TLC 250		R
6	FLOATING DOCK	54.97	16.8					TLC I 250		R
7	FLOATING DOCK	58.97	16.8					TLC II 250		R
8	FLOATING DOCK	111.75	19.45					TLC 1000		R
9										
10										

B USE = Building (B), Repairing (R), Building & Repairing (B & R)

② CRANES

	A TYPE	MAX. LIFT LOAD	MAX. ELEVATION	MAX. REACH	NUMBER	LOCATION
1	P.C.	3.5 T			1	
2	O.H.C.	1.5 T			1	
3	O.H.C.	3 T			1	
4	O.H.C.	5 T			2	
5	O.H.C.	10 T			2	
6	O.H.C.	15 T			1	
7	T.C.	3.5 T			1	
8	P.C.	3 T			3	
9	P.C.	10 T			3	
10	P.C.	15 T			1	
11	FORK LIFT	3 T			1	
12	JACK	50 T			1	
13	JACK	75 T			5	
14	JACK	100 T			3	
15	JACK	150 T			2	

Type: Portal crane (P.C.) Over Crane (O.H.C.) Tower Crane (T.C.)
Level Luffing crane (L.L.C.) "L" Shape Crane (L.S.C.) Roll-off Crane (R.C.)

③ 1133 & SHOP

Stage & Shop	Total area	Area (m ²) Shop area	Slab area
Site/Building			
Steel stock yard			
Fabrication shop			
Subassembly shop & yard			
Grand assembly yard			
Block stock yard			
Berth & Dock			
Pipe shop	657.75 x 8 419.6 x 8		
Pipe stock yard			
Machinery shop	725x1, 535x1 4729.7x1		
Carpenter shop	719.5 x 8 1555.2 x 8		
Plater shop	3029.0		
Electrical shop	160.0		
Painting shop	307.4		
Outfitting shop			
Rigging shop			
Iron & Casting shop	1726.0		
Warehouse	432x1, 1557.7x1 397x1, 352x1		
Welding shop	2118.3		
Roof loft	429.0		
Braving room	230.0		
Repairing			
Berth & Dock			
Roll shop			
Machinery shop			
Outdoors working area			
Stockyard			
Warehouse			
Over-leaf			

④ MACHINERY & EQUIPMENT

NO	TYPE CAPACITY	LOCATION	NUMBER
1	Straightening Roll thickness 12.74/N 1973	Plate Shop	1
2	Bending Roll thickness 250/N 1915	"	1
3	" thickness 250/N -	"	1
4	" thickness 50/N -	"	1
5	Profile Bending Machine Motor Electricity 7.5 HP 1933	"	1
6	Plate Shear thickness 12.74/N 1927	"	1
7	" " 12.74/N 1930	"	1
8	" " 120/N 1938	"	1
9	Machine Press 100 ton 1953	"	1
10	" Motor Electricity 15 HP 1928	"	1
11	" " 25 HP 1938	"	1
12	Machine Fanner 1938	"	1
13	" " 1922	"	2
14	Pneumatic Chipping Chisel Bag/HR ²	"	15
15	Drilling Machine Ø1A(Ø) Ø" - 1" 1955	"	2
16	Punching Machine thickness 104/N 1935	"	1
17	Furace 30x40x2	"	13
18	Over Head Crane 3 ton	"	1
19	" 5 ton	"	1
20	Over Head Crane 15 ton	"	1
21	Welding Generator	Welding Shop	1
22	"	"	20 HP W/ASIA 13
23	Welding Transformer	"	13
24	Welding Converter Ampere 50A-220V	"	1
25	Seat Automatic Welding Machine Ampere 150V	"	1
26	Welding Floor Area 2.547m ²	"	1
27	" Area 1 1/4 x 2.547	"	1
28	" Area 2.5 x 6.62	"	1
29	Welding Floor Area 1 1/4 x 2.547	"	1
30	Automatic Welding Machine Ampere 400-200A 1973	"	1
31	" " " 1974	"	2
32	Automatic Cutting Torch	"	2
33	Cutting Torch	"	24 units etc. etc/area

MACHINERY & EQUIPMENT

NO	TYPE CAPACITY	LOCATION	NUMBER
34	Cutting Torch	Welding Shop	1
35	Cutting Floor Area 8.515m ²	"	1
36	Pipe Bending Machine Ø1A(Ø) 3"-6" 1974	Pipe Shop	1
37	" " 1"-3" 1974	"	1
38	Grinding Machine " 3000/N	"	1
39	Bending Table Area 1m ²	"	1
40	" " 1m ²	"	1
41	Bending Table " 2m ²	"	1
42	Drill Ø1A(Ø) 1/8"-1 1/4"	"	2
43	Burrer	"	2
44	Rock saw Step 1500/N 1931	"	1
45	Lathe Ø1A(Ø)xDISTANCE 125x1000/N 1962	"	1
46	" " 125x1000/N -	"	1
47	Resin Res NTC Pipe (PVC) 1973	"	1 BA
48	Bangka Brad Pipe 1"-4" 1931	"	1 BA
49	" " 1/4"-1 1/8" 1932	"	1 BA
50	Purca Hydraulic NTC Pembengkok Pipe	"	1 BA
51	Resin Bar	"	6 BA
52	Gunting Bisk Target 2 HP 1937	"	1 BA
53	Resin Pors Target	"	1 BA
54	Kral Target	"	3 BA
55	Resin Poles	"	1 BA
56	Pengikat Kaling Target	"	1 BA
57	Resin Target	"	1 BA
58	Lathe Ø1A(Ø)xDISTANCE 180x2550/N 1937	Machine Shop	1
59	" 150x1450/N 1949	"	7
60	" 100x2000/N 1962	"	6
61	" 250x1300/N 1949	"	1
62	" 200x1520/N 1939	"	1
63	" 300x2350/N 1947	"	1
64	" (S HP) 1937	"	1
65	" 125x1900/N 1962	"	3
66	" 100x550/N 1941	"	1
67	" 100x300/N 1941	"	-

MACHINERY & EQUIPMENT

NO	TYPE CAPACITY	LOCATION	NUMBER
68	Lathe Ø1A(Ø)xDISTANCE 220x2550/N 1937	Machine Shop	-
69	" 50x200/N 1936	"	-
70	" 450x300/N 1936	"	1
71	" 650x250/N 1939	"	1
72	" 450x450/N 1921	"	1
73	" 325x1000/N 1926	"	1
74	" 250x220/N 1938	"	1
75	" 50x350/N 1955	"	1
76	" NTC. POKOS ENGINE 1974	"	1
77	" 276000/N 1974	"	1
78	" 200x1350/N 1949	"	1
79	" 200x1900/N 1937	"	2
80	" 300x1900/N 1926	"	1
81	" 100x850/N 1950	"	1
82	Vertical Lathe 200x1400/N 1921	"	1
83	" 450x600/N 1948	"	1
84	Vertical Drilling Mach Ø1A(Ø) Ø"-1 1/2" 1958	"	1
85	" " Ø"-1" -	"	2
86	" " Ø"-3" 1927	"	2
87	Horizontal Drilling Mach Ø1A(Ø) 1915, 1915, 1930, 1930	"	4
88	Radial Drilling Mach Ø1A(Ø) Ø"-3" 1943	"	1
89	" " 3/8"-3" 1939	"	1
90	" " 2"-100/N 1949	"	1
91	" " 1 1/2"-200/N 1951	"	1
92	" " Ø1A(Ø) 4"-200/N 1941	"	1
93	Horizontal Milling Mach STEP 2 VITEK 150 x 6000/N 1943	"	1
94	" " 229 x 7200/N 1949	"	1
95	" " 3000/N 1921	"	1
96	" " 11.5 x 11.5 1925	"	1
97	" " 11.5 x 11.5 1950	"	1
98	Vertical Milling Mach Ø1A(Ø) 1915, 1930, 1930	"	1
99	Table Framer VITEK 2 STEP 1957	"	1
100	" " 11.5 x 11.5 1922	"	2
101	" " 100 x 100 1922	"	1
102	" " 100x2500 A/N 1926	"	1
103	" " 100x3000 A/N 1915	"	1