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19369

Chittagong, November 1991

language English
pages seventy six (76)

SEP
1991

ASSISTANCE PROGRAMME
to the
Chittagong Dry Dock & Heavy Steel Structure Works
(presently named Chittagong Dry Dock Ltd)
DP/BGD/84/018

FINAL REPORT
subcontract no90/175

prepared by Gdansk Shipyard
Subcontractor

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I Explanatory notes

CDDL	Chittagong Dry Dock Ltd
CDD & HSSW	Chittagong Dry Dock & Heavy Steel Structure Works , Chittagong , Bangladesh
CTA	Chief Technical Advis r
GOVERNMENT	Government of the People's Republic of Bangladesh
PROJECT AREA	CDDL , Chittagong , Bangladesh
SG.SA	Gdansk Shipyard (Stocznia Gdanska SA)
SUBCONTRACTOR	SG.SA
TEAM	Subcontractor's Team
TO/PC	Subcontractor's Training Officer / Project Co-ordinator
PROJECT	UNIDO Project DP/BGD/84/018
CONTRACT	UNIDO Contract no.90/175

II Abstracts

In March 1985 the Government of the People's Republic of Bangladesh has signed an agreement with United Nation's Development Programme and with United Nation's Industrial Development Organisation to carry out an assistance programme at the Chittagong Dry Dock & Heavy Steel Structure Works , Chittagong and the Project has been named "BGD/84/018-Assistance Programme to CDD & HSSW" .

The CDD & HSSW presently named Chittagong Dry Dock Ltd has received the following assistance till December 1990 :

July 84 - June 85 first CTA

Aug. 85 - Oct. 86 Keppel Shipyard (Singapore)
support Team

Dec. 87 - Nov. 88 second CTA

The second phase of Project started in December 1990 and the following assistance was given :

Dec. 90 - Nov. 91 Gdansk Shipyard (Poland)
support Team

Dec. 90 - Nov. 91 third CTA

III Introduction

Gdansk Shipyard was awarded the Contract no.90/175 to provide technical assistance to Chittagong Dry Dock Ltd , Chittagong , Bangladesh in order to upgrade her operations . The contract was based on document titled "Terms of Reference for Subcontract (Phase II) , Project DP/BGD/84/018" . The said document and also short operational description were submitted to SG.SA in order to prepare suitable team of specialists ready to fulfil requirements described in Contract .

The Contract aimed to assist CDDL in her operation and development by :

- a) strengthening the operations of CDDL's concerned departments ;
- b) on-the-job training of the local foremen and skilled workers/staff ;
- c) widening the range of the performed repair jobs , assuring their completeness and good quality ;
- d) upgrading operational skills for the operation of machine tools , instruments and other equipments ;
- e) introduction of an efficient maintenance service for the machine tools , plants and other equipment of the dockyard ;
- f) setting up of an internal permanent training system for upgrading local skills in basic ship repair trades .

The Subcontractor was expected to provide a Team of five highly qualified and experienced foremen having at least ten years of experience in their respective fields of specialisation . Home Office was to be provided in order to support Team and to back-stop personnel serving in Project Area .

The foremen Team of five members and TO/PC commenced their assignment in Chittagong Dry Dock Ltd from the beginning of December 1990 .

The team fulfilled it's assingment and left Chittagong in the end of November 1991 .

TO/PC visited Chittagong in total four times and spent one month time in Project Area supplying Team with necessary professional data and supervising Team activities .

The team members and their respective areas were as follows :

team member		specialisation/project function
Mr. Roman	Dokowicz	dry dock maintenance/foreman
Mr. Bronislaw	Samp	hydraulic systems /foreman
Mr. Jerzy	Skoczen	welding /foreman
Mr. Pawel	Swierczynski	diesel engine /foreman
Mr. Michal	Zloczewski	automation and instrumentation/ foreman & Team Leader
Mr. Wlodzimierz Maliszewski		Training Officer/Project Co-ordinator

As a condition of Contract six bi-monthly work Progress Reports were submitted to UNIDO , Vienna .

A copy of each report were also submitted to CDDL General Management and to UNIDO office , Dhaka .

The said Reports cover period of Team activities from December 1990 to November 1991 . The same period is covered by this Final Report which is to be considered as compendium of reports have been submitted periodically . The Report is divided into seven main areas and the format is as follows :

1. - activities in home office prior to arrival to the Project Area ;
2. - activities in the first period of assingment ;
3. - operational area - contains description of all works carried out by shipyard and also with co-operation with team members ;
4. - plant and maintenance area - covers repairs and maintenance carried out to shipyard equipment , plant and machinery ;

5. - functional areas - contains activities of each specialist/
Team member in their respective functions ;
It covers marine and non-marine jobs , theoretical
discussions , papers prepared , recommendations
offered and advices submitted ;
The areas were :
 - dry dock maintenance ;
 - hydraulic systems ;
 - welding ;
 - diesel engine ;
 - automation and instrumentation ;
 - home office service ;
6. - rescue action after cyclone and tidal bore - covers
jobs performed and advices submitted after cyclone ;
7. - generals - covers areas common to some of the functions
as well as areas not covered by any of the individual
functions of particular expert .

IV Operational section

1. Allied production of CDDL			
month customer work description			
XII90	local	repair by welding of knife holder for guillotine machine	1pc
"	"	shaft repair	1pc
"	"	fabrication of mild steel tank for chemical complex	1pc
"	"	fabrication of sell-bed for chemical complex	1pc
"	"	hanger shaft repair	1pc
"	"	rotor and stator disc repair by machining	1pc
I91	"	knife holder fabrication by welding	1pc
"	"	propeller shaft repair	1pc
"	"	fabrication of drum roller for steel mill	8pcs
"	"	fabrication of I beam	2pcs
	foreign	welding , sand-blasting and painting of mild steel pipes 600 tons	
II91	local	turbine repair	1pc
"	"	steel bridge 50 feet long	1pc
	foreign	fabrication of steel guide support for pile driving	1pc
III91	local	crank shaft fabrication	1pc
"	"	steel bridge 70 feet long	1pc
"	"	steel bridge 100 feet long	1pc
	internal	keel-blocks repair	20pcs
	local	fabrication of cooling pipe	60pcs
"	"	roller grinding	1pc
"	"	log conveyor chain ; link fabrication	781pcs
"	"	cooling pipe fabrication	48pcs
IV91	"	control valve	1pc
"	"	fabrication of zinc bath	1pc
"	"	steel bridge 80 feet long	1pc
"	"	zinc bath repair	1pc
V 91	"	repair of microwave tower 200 feet high	
"	"	repair of propeller shaft	1pc
"	"	fabrication of mild steel ring	92pcs
VI91	"	fabrication and erection of TV tower	1pc
"	"	steel bridge 30 feet long	1pc
	internal	cylone damage complex repair works	under process
VII91	"	body of pump repairing	1pc

VI91	internal	cyclone damage complex repair works	under process
VII91	"	pump body repairing	1pc
	local	steel bridge 80 feet long	1pc
	"	shaft repairing	1pc
	"	steel bridge 70 feet long	1pc
	"	multi-jet condenser for sugar mill repair	1pc
	"	steel bridge 140 feet long	1pc
	"	steel bridge 50 feet long	1pc
VIII91	"	drum shaft welding	1pc
	"	fabrication of galvanizing zinc bath	2pcs
	foreign	fabrication , sand blasting and painting of fender	8pcs
	local	fabrication of chasis	4pcs
	"	economiser fabrication	1pc
IX91	"	repair of water pump bearing housing	1pc
	"	fabrication of pulley	3pcs
	"	steel bridge 40 feet long	1pc
X91	"	fabrication of exhaust fan blade	
	"	gear box bearing housing repair	2pcs
	"	thread making for shaft	4pcs
	"	shaft sprocket repair	1pc
	"	plate rolling/bending	6pcs
	"	trueness checking of cran shaft	1pc
	"	straightening of roller for bending machine	2pcs
XI91	"	repairing of separator motor shaft	1pc
	"	repairing of bearing housing	1pc
	"	repairing of screw shaft for pump	1pc

DB

Sl. No.	Name of vessel	Name of client	Particular/dim. of the vessel.	Period of stay (in dock)		Period of stay at Jetty.		Main job done.
				From	To	From	To	
1.	M.V. B/ASHA.	B.S.C.	Class:Lloyd's LxBxD:145.7x18.65 GRT: 8,275 MT DWT: 14,931 MT Type:C/Carrier.	26.11.91	17.1.91	17.1.91	2.31.91	1. General services. 2. Hull cleaning & Painting (Bottom area & bottop area) 3. Anchor and anchor chain. 4. Chain locker. 5. Sea chest. 6. Storm valves. 7. Ultrasonic thickness gauge. 8. Rudder works. 9. Propeller tail shaft. 10. Sea valves.
2.	DREDGER HAM-219 HAM BANGLADESH. (FOREIGN)		Class: LxBxD=65.5x14.3 x 3.5m GRT: 620 MT DWT: Type:Cutter suction Dredger.	18.1.91	23.1.91			1. General Service. 2. Hull cleaning & Painting. 3. Sea chest & strainer works. 4. Cathodic protection works.
3.	F.V. J.UDYAM	Bengal Fisheries Limited.	Class:Mercantile Fisheries Dept. LxBxD:31.85x7.2x3.4m GRT:192.72 DWT: Type:Fishing trawler	18.1.91	23.1.91.			1. General Services 2. Hull cleaning & Painting (Bottom area & Bottop area) 3. Cathodic protection. 4. Sea chest & Strainer. 5. Plate works 56 kg. 6. Rudder works.
4.	F.V. MEENHAR-2	Meenhar Sea Foods Ltd.	Class: LxBxD:36.4x25x4.70m GRT:191.23 MT DWT: Type:Fishing trawler.	27.1.91	12.2.91			1. General Services. 2. Hull cleaning Painting. 3. Sea chest & strainer works. 4. Steel works-0.091 MT. 5. Rudder works.

Sl. No.	Name of vessel	Name of client	Particular/dim. of the vessel.	Period of stay (in dock)		Period of stay at Jetty		Main job done.
				From	to	From	To	
5.	M.V. B/KAKOLI	B.S.C.	Class: Lloyd's LxBxD: 154.8x22.4x 3.4m GRT: 12,572.65 MT DWT: 17,234.40 MT Type:C/Carrier.	18.2.91	30.7.91.			<ol style="list-style-type: none"> 1. General Services 2. Hull cleaning & Painting (Bottom area & Bottop area) 3. Tank cleaning. 4. Rudder works pressure testing. 5. Steel works- 54.60 MT 6. Anchor & Anchor chain works. 7. Chain locker. 8. Sea chests. 9. Storm valves. 10. Propeller tail shafts. 11. Sea valves.
6.	M.V.AL-TABITH	M/s.Khalil & Sons Bangladesh	1. Class-G.L. (Germenis-cler Lloyds) LxBxD-129(Loa) 21.04 x 12.3M GRT: 9304.79 MT DWT: 14,803 MT Type:Cargo Carrier	7.8.91 -	16.8.91	1.8.91-6.8.91		<ol style="list-style-type: none"> 1. General services 2. Hull cleaning & painting Bottop area & Bottop area) 3. Cathodic area 4. Anchor & Anchor cable 5. Chain locker 6. Sea-chest & strainer 7. Rudder & Tail shaft 8. Sea valves.
7.	M.V.AL-SWAMRUZ	M/s.Atlas Shipp. ing Lines Ltd.	Class: NKK LxBxD: 143.50x21x 2.66M GRT: 8522 M.T DWT: 12,350 M.T Type: Cargo Carrier	17.8.91	-25.8.91			<ol style="list-style-type: none"> 1. General services 2. Hull cleaning & painting (Bottom area & Bottop area) 3. Sea chest & strainer 4. Anchor & Anchor cables works 5. Plate works 2.61 M.T 6. Storm valve overhauling 7. Rudder works 8. Tail shaft 9. Overhauling of sea valves.

Sl. No.	Name of vessel	Name of clients	Particular/dim. of the vessel.	Period of stay (in dock)		Period of stay at jetty		Main job done
				From	To	From	To	
8.	M.V.B/SWAPNA	B.S.C.	Class: Lloyds LxBxD: 130.8x19.38 x10.66M GRT: 7077.17 M.T. DWT: 9190.00 MT Type: Cargo Carrier	26.8.91	2.9.91	3.9.91		1. General services 2. Hull cleaning & painting (Bottom area)
9.	M.V. PERL ONE	M/s. Continantal Liner agencies	Class: G.L. (German- sher Lloyds) 130.00x19.20x11.20M GRT: 7557.20 M.T DWT: 11,811.50 M.T Type: Cargo Carrier	4.9.91	10.9.91	10.9.91	12.9.91	1. General services 2. Hull Cleaning & Painting (Bottom & Bottop area) 3. Sea chest & atrainer 4. Anchor & anchor cable works 5. Plate works = 210 Kg 6. Storm valve overhauling 7. Rudder works 8. Tail shaft 9. Overhauling of sea valves.
10.	B.N.S. TANVEER	Bangladesh Navy	Class: NAVAL 38.78x5.3x3M GRT: DWT: Type: Escort boat	16.9.91	- continued			1. General services 2. Hull cleaning & painting 3. Rudder Works - 4 nos. 4. Propeller shaft works-4nos. 5. Under water gratings 6. Sea water inlet 7. Plate renewal works.
11.	B.N.S. ABU BAKAR	-do-	Class - NAVAL 103.66x12.2x8.12M GRT - 2323.61 DWT - Type: Frigate	16.9.91	"			1. General services 2. Hull cleaning, Sand blasting, painting. 3. Rudder works 4. Under water valves fitting 5. Plate renewal 6. Tailshaft works-(2nos.) withdrawl machining, bush renewal etc.

Sl.No.	Name of vessel	Name of Clients	Particular/dim. of the vessel	Period of stay (in dock)		Period of stay (at jetty)		Main job done.
				From	To	From	To	
12.	M.V. LOYAL BIRD	Al-Amin Sea Trans	GRT=5943.49 T NRT=3887.19 T DWT=10,160.62 T LxBxD=127.58x19x9.55m Type: Cargo	4.11.91	20.11.91			1. General Service 2. Hull cleaning/painting (Bottom & Bootopping) 3. Anchor & anchor chain 4. Tail shaft. 5. Propeller. 6. Rudder. 7. Sea/saction. 8. Storm valve.
13.	AHM-1	Ahmed Hakodate	LxBxD:44.57x7.6 x 3.33 GRT:1,224.92 Type:Fishing Trawler.	4.11.91	20.11.91			1. General Service. 2. Hull cleaning & Painting 3. Zinc anodes. 4. Sea chest & stern 5. Sea valves.
14.	S.T.GAUSEL AZAM		GRT:162.89 LxBxD:38.4x6.8x3.00 Type:F/Trawler.	4.11.91	20.11.91			1. General Service. 2. Hull cleaning & Painting 3. Anchor & Anchor cable 4. Tail shaft.
15.	M.V.VIVARI No.2 (FOREIGN)	Bengal Marine Ltd.	GRT:8909.49 DWT: 14,589 LxBxD:141x20.43 x 11.74	23.11.91				1. General Service. 2. Hull cleaning/Painting (Bottom & Bottopping) 3. Anchor & anchor chain. 4. Tailshaft/propeller/rudder Sea suction/sea valves.
16.	F.V.MOITRI-T	Shimizue Specialised	GRT:287.22 DWT: LxBxD:48.30x7.80	23.11.91				1. General Service. 2. Hull cleaning & Painting. 3. Zinc anodes. 4. Sea chest & stern 5. Sea vavles.
17.	F.V.MEENHAR-1	Meenhar Sea Food ltd.	GRT:191.23 LxBxD:36.20x7.20 x 2.60.	23.11.91				

-do-

AFR.

Sl.No.	Name of vessel	Name of client	Particular/dimension of the vessel.	Period of stay at jetty.		
				From	To	
1.	M.V. B/UPOHAR	B.S.C.	Class: LxBxD: GRT: 8,304.14MT DWT: 14,550.00 M.T. Type: Cargo Carrier.	8.11.90	13.11.90	1. General Service.
				16.11.90	19.11.90	
				6.12.90	21.12.90	
				11.1.91	16.1.91	
				12.2.91	18.2.91	
				7.3.91	10.3.91	
				19.3.91	20.3.91	
				26.3.91	29.3.91	
				6.4.91	7.4.91	
				8.4.91	23.4.91	
				19.5.91	20.5.91	
				28.5.91	28.4.6.91	
				2.	M.V. B/ASHA	
17.3.91	23.3.91					
6.3.91	7.3.91					
21.3.91	23.3.91					
2.4.91	8.4.91					
18.4.91	20.4.91					
10.6.91	12.6.91					
7.7.91	11.7.91					
19.8.91	25.8.91					
3.	M.V. S RANI	M/s. Samudrajatra Shipping Lines Ltd.	Class : LxBxD : GRT : DWT : Type :	16.11.90	18.11.90	- do -
4.	M.V. B/BAANI	B.S.C.	Class: LxBxD: 140.99 x 20.42 GRT : 9345.51 DWT : Type : Cargo Carrier.	22.11.90	23.11.90	- do -
				9.12.90	14.12.90	
				19.12.90	20.12.90	
				6.3.90	7.3.91	
				23.3.91	24.3.91	
				20.4.91	24.4.91	
				12.6.91	14.6.91	

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5.	M.V. B/MITA	B.S.C.	Class : LxBxD : 156.14x23.34x13.11 GRT : 10,621.00 DWT : 11,339.00 Type : C/Carrier.	20.11.90 14.5.91 30.6.91	21.12.90 15.5.91 4.7.91	30
6.	M.V. ALTAIR	S.S.Shipping and Trading Ltd.	Class : LxBxD : GRT : DWT : Type :	27.11.90	7.12.90	30
7.	M.V. ALYAN	Bengal Shipping Ltd.	Class : LxBxD :	3.12.90	6.12.90.	30.
8.	M.V. KARNAFULI	M/s.Marzan Enter- prise.		8.12.90	8.12.90	30
9.	M.V. LALILA	M/s.International liner agencies Ltd.		20.12.90	20.12.90	30.
10.	M.V. LEVIN	-do-		27.12.90	28.12.90	30.
11.	M.V.B/SHOBA	B.S.C.	Class : LxBxD:144x21.40x12.20 GRT : 9,840.00 M.T. DWT : 9,190.00 Type : C/Carrier.	26.12.90	27.12.90	30.
12.	M.V.B/SWAPNA	B.S.C.	Class : LxBxD:130.8x19.37x10.60 GRT : 7077.17 M.T. DWT : 9,190.00 M.T. Type : C/Carrier.	23.12.90 16.4.91 23.4.91 23.5.91	3.1.91 18.4.91 30.4.91 30.6.91	30.
13.	M.V. AL-TAJWAR	Khalil & Sons.	GRT : 10,102.13 M.T.	9.1.91 10.2.91	14.1.91 12.2.91	30.
14.	DREDGER HAM-219	HAM BANGLADESH	LxBxD:65.5x14.3x3.5 GRT : 620 M.T. Type : Cutter suction dredger	13.1.91 24.1.91	18.1.91 28.1.91	30.

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15.	M.V.B.OTICO		Class :	28.1.91	28.1.90
16.	M.V.B/SAMPAD	B.S.C.	LxBxD: 154.67x19.5x12.00 GRT : 9087.00 MT DWT: 12,883.00 Type: C/Carrier	23.1.91 5.3.91 7.4.91 11.5.91 4.6.91 19.6.91 31.8.91 12.9.91	21.2.91 6.3.91 9.4.91 14.5.91 7.6.91 26.6.91 7.9.91 13.9.91
17.	M.V.B/KIRON	B.S.C.	Class: Lloyd's LxBxD: 154.67x19.5 GRT : 9,134.00 DWT : 10,950.00 Type : C/Carrier.	19.2.91 7.3.91 12.7.91	21.8.91 8.3.91 23.7.91
18.	M.V.MASAK	Khalil & Sons		11.2.91 6.8.91	11.2.91 6.8.91
19.	M.V.B/KALLOL	B.S.C.	Class: Lloyds GRT : 12,572.65 DWT : 17,222.00	15.3.91	19.3.91
20.	KANDARI-2	C.P.A.	-	4.3.91	4.3.91
21.	JUARMA	-	-	6.3.91	6.3.91
22.	M.V.NAUREEN	CHEC		25.3.91	28.3.91
23.	BARGE	M/s.Hakkani Papers and Board	-	24.7.91	24.7.91
24.	F.V.KASIKIN-10	M/s.HASIKIN	-	13.4.91	14.4.91
25.	F.V.J.JATRA	Bengal Fisheries Ltd.	-	2.6.91	6.5.91
26.	F.V.J.UDYAM	-do-	Class: Mercantile LxBxD: 31.85 x 7.2 x 3.4m GRT : 192.72 Type: Fishing trawler.	2.5.91 8.5.91	6.5.91 9.5.91

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27.	F.V. IMAM No.1,2,3	Imam Fishing Ltd.	-	2.5.91	6.5.91
28.	M.V. B/URMI	B.S.C.	Class: LxBxD: 144.00x21.40x12.20m	28.5.91	28.5.91
29.	B.L.V. ALI	C.P.A.	-	21.5.91	21.5.91
30.	M.V. B/PROGATI	B.S.C.	LxBxD: 131x19.37x10.66 LxBxD: 131x19.37x 10.66 GRT: 7077.13 MT DWT: 9190.00 MT Type: C/Carrier.	7.6.91	10.6.91
31.	M.T.B/JYOTI	B.S.C.	LxBxD: 138x22.9x9.65 GRT : 8672 MT Type: Oil Tanker	15.6.91	18.6.91
32.	No.LB-750 & one Tug Boat.	United liner agencies (BD)Ltd.	-	5.7.91	6.7.91
33.	M.V.B/MAMATA	B.S.C.	GRT:- 12,193.10	4.7.91	5.7.91
34.	FOMARA	-		7.7.91	7.7.91
35.	F.V.MITA	Bengal Fisheries Ltd.		13.7.91	14.7.91.
36.	M.V.SERDICA	Centrade Shipping Lines Ltd.		11.8.91	12.8.91
37.	M.V.AL-TABITH	Khalil & Sons.	Class: LxBxD: 139 x 21.04 x 12.3 GRT : 9304.79 MT DWT : 14,803.00 Type: Cargo Carrier.	1.8.91 18.8.91	7.8.91 19.8.91

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38.	M.V.VALLETA-II	Progati Shipping Ltd.	-	12.8.91	15.8.91.
39.	F.V.FRIENDSHIP-2	Friend Fishing Ltd.		7.9.91	2.10.91
40.	KASUGA	Mariner's(BD)	GRT. 2924	17.9.91	17.9.91
41.	M.V.PEARL ONE	M/s.Continental Liners Agencies.	LxBxD:130.00x19.20 x 11.20 GRT : 7577.20 DWT: 11,811.00 MT Type: Cargo Carrier	10.9.91	12.9.91
42.	B.N.BAL BAN	Bangladesh Navy		14.9.91	14.9.91
43.	P.B.SHAFEN	Customs, Ctg.	LxBxD:100'x30'x8' GRT : 250	24.9.91	Continue. -Steering gear hull and deck works main engine electrical system.

V Subcontractor activities

1. Activities of the Team prior to arrival to the Project Area

Members of the Team participated in series of meeting before departure from Home Office in order to discuss in depts :

- aim of the Project ;
- scope and range of work the Team shall perform at the Project Area in accordance with "Terms of Reference" ;
- essential items/articles , professional data etc. to be carried with the Team to the Project Area ;
- local socio-economic , political , geographical etc. condition of the Country where Team was scheduled to work and stay ;
- medical tests and other preparation of the Team for working in different climatic conditions .

Whole Team was available for briefing in UNIDO HQ Vienna in order to fulfill preparations to start activities in Project Area . In course of briefing , the Team had been apprised of on the followings :

- information on the activities of CDDL ;
- informations about assistance received by CDDL so far from UNIDO ;
- up to date evaluation on the realisation of UNIDO Assistance Programme to CDDL conducted by an independent International Consultant ;
- shipbuilding and shiprepair industries in Bangladesh ;
- results/achievements made by the earlier Subcontract Team under the same Assistance Programme as Phase I ;
- ways of implement inputs to be provided by Team under Phase II of Programme ;
- guideline on ways of reporting to be made .

The Team is thankful to the UNIDO officials for their care and assistance extended to the Team during their stay in UNIDO HQ .

Due to sudden unfavourable political situation in Bangladesh ,

UNIDO HQ lost contact with Dhaka and as a result the departure of the Team to Project Area was delayed .

The Team reached Project Area in the beginning of December 1991 and received further briefing at the local UNDP/UNIDO Dhaka office .

2. Activities of Team in the first period of assignment

The activities of the Team at CDDL till the arrival of CTA was as follows :

- acquaintance with the current activities of the Shipyard ;
- prevailing with the fields of Team members ;
- compare and check the activities of the shipyard with reference to the "Final Report" by earlier Subcontractor Team ;
- meetings with Technical Officers of the Yard regarding Team activities ;
- acquaintance with the efficiency and skill of the workers ;
- discussion with the Yard Management on preliminary plan of action of the Team with the provision of the Project Input ;
- inventory of items belonging to UNDP/UNIDO at CDDL .

After the arrival of CTA the report/statement was prepared by him in co-operation with Team members after having an interval of about two years between the end of Phase I and start of Phase II. Also several advices were submitted to CDDL and works on ad-hoc basis were performed in that period . Description of those works was given in operational section of the Report .

3. Functional section

MAINTENANCE

M1. repair and maintenance of fork lifters (RP6)

Maintenance of hydraulic system of 4 nos fork lifters was carried out . Comments were given on subjects :

- dismantling of hydraulic units ;
- hydraulic distributors ;
- hydraulic gear box ;
- hydraulic gear pumps ;
- hydraulic cylinders ;
- conduits ;
- oil tanks ;
- overflow valves ;
- filters ;
- assembly of packing rings .

Measurement sheets prepared as samples , measurements conducted :

- hydraulic cylinder ;
- hydraulic gear pump ;
- control valve .

M2. Main dewatering pump no 3 (PR6p57)

As a part of restoration action of the pump room , general maintenance of main pump and electrical part was carried out .

M3. Electrical motors cleaning method : proposal (RP6p57)

Proposal of maintenance and also ship equipment repair method was given , accepted by CDDL and introduced .

M4. 50/15 ton DIA jetty crane (PR6p58)

Maintenance and repair of crane's electrical equipment was carried out .

- M5. High pressure gun nos 2
Equipment for ship's hull cleaning by means of compressed water was under repair works , periodical and general maintenance .
- M6. 11kV circuitbreakers nos 7 (PR6p59 and PR5)
Periodical , general maintenance and repairs on emergency basis were carried out .
- M7. 15 ton MAN dock side crane (PR6p50)
Luffing control electrical system maintenance and repair .
- M8. Bilge block system (PR5p23)
Periodical and general maintenance of hydraulic and electrical systems were carried out . The following was done :
- direct supervision of works ;
- repair and maintenance recommendations given ;
- sketches prepared in order to provide explanations .
- M9. Centrifugal two-stage water pump (PR5/32)
Maintenance carried out on emergency basis . Explanations given . Works carried out .
- M10. Maintenance schedule for electrical equipment (PR5p75)
Specific for electrical equipment proposal was prepared .
The proposal consists of the following :
- general description ;
- proposed measuring and inspection sheets ;
- particular description of maintenance works to be carried out on equipments (several samples) .
- M11. Drainage pumps of dock (PR4p10)
Maintenance and repairs were carried out subsequently .
- recommendations given ;
- new repair technology suggested ;
- works carried out .

M12. 250 ton frame bender (PR4p32)

- recommendations given ;
- measurings sheets as proposal prepared ;
- some technical data given as example in term of lack of original manufacturer's manual .

M13. Portable diaphragm submersible pumps

- maintenance suggestions given ;
- repair technology proposed ;
- sketches prepared in connection with works conducted ;
- works carried out .

M14. Inspection Schedule prepared for lifting appliances

The said Schedule consists of list of necessary works to be carried out in connection with crane's maintenance . Those was prepared on basis of experts professional experience only but due to lack of original manufacturer's documentation . This is to be updated against the proper maintenance manufacturer's recommendations as soon as possible .

M15. Air compressors nos 4 (PR3p33)

Maintenance and repair works carried out .

Suggestions prepared on subject :

- measurement of pistons ;
- measurement of piston liners ;
- maximum permissible value of piston wear-down ;
- maximum permissible wear-down and ovality of cylinder liners ;
- measurement of piston rings etc .

- M16. Duplicating pantograph (PR3p53)
Commissioning of workshop equipment . Works schedule prepared , works performed partialy , not completed due to cyclone .
- M17. Inspections carried out on yard equipment (PR2p12)
Several items of equipment was under periodical inspection :
- starboard sluice dock gate/penstock ;
 - bilge block system ;
 - 40 ton dock side crane ; (also PR1p17)
 - diesel engine driven air compressors ;
 - diesel engine driven auxiliary generators ;
 - drainage and bilge pumps of dock (also PR1p43)
- For each item of equipment inspection report and works programme were prepared .
- M18. List of maintenance schedules prepared in connection to the above inspections (PR2p20)
- penstock systems ;
 - generator's diesel engines ;
 - 15 ton MAN dock side crane ;
 - air compressors and diesel engines (also PR1p29,33);
 - auxiliary generators (also PR2p42,PR1p52) ;
- M19. Power factor control system (PR2p58)
Repair of controler carried out - not completed due to lack of technical documentation . Substitutes recommended . Theory discussed .
- M20. Repair of cast iron shaft covering pipes (PR1p25,PR2p62)
On emergency bas s works were carried out in order to repair the bilge pumps shaft line cover .
- M21. Basic recommendations in connection to hydraulic maintenance (PR1p27)
- M22. Inspection carried out on dry dock electrical equipment (PR1p35)

Restauration and rescue action after cyclone (PR3p57)

- CR1. Primary maintenance , anticorrosion protection provided on machine tools in workshops as primary maintenance in first days after cyclone .
- CR2. Dewatering of TS2 compartment and dock's pump room Direct participation in rescue works . Operational maintenance of equipment involved . Works carried out in connection to schedule prepared by CDDL Management . (PR3p57)
- CR3. Participation in preparation of schedul for preliminary reacue works (electrical) (PR4p55)
- CR4. Inspections and recomissioning of necessary for rescue action electrical equipment carried out . Suggestions given . Estimation of works range prepared . (PR3p62)
- CR5. Miscellaneous :
- verification of roller bearings (PR3p79)
almost all elecrtical motors were effected by salty water so that verification of bearing was necessary due to lack of sufficient amount of spare parts ; suggestions given ; works supervised ;
 - checking of alingment axiality of the shafts (PR3p82)
in connection to rescue and rehabilitation action this was one of the main technical problem ; adivices given ; works carried out ;
- CR6 . Temporary control circuits for dock's pumps (PR3p74)
Proposal of temporary control circuits for all dock's pumping units have been prepared . In this connection a number of explanations was given , list of necessary items and suitable sketches prepared . Suggestions have been fully utilised by CDDL . As a result developed designes were prepared by CDDL engineers .

CR7. Huge number of Yard equipment and machinery was recommissioned during restoration action (PR3p57)

- pumps of pump room :- bilge pumps nos 4 ;
 - drainage pumps nos 4 ;
 - main pumps nos 2 ;
 - fire pumps nos 2 ;
- dock side capstans nos 2 ;
- sluice gates operational system nos 2 ;
- bilge block's system ;
- main dock gate superstructure and dewatering system ;
- dock side and jetty cranes nos 3 ;
- machine tools and workshop equipments .

CR8. TS2 Substation and Switchgear

- megatest of all belonging to electrical cables ;
- dismantling of effected equipments ;
- methods of possible and permissible repairs discussed ;
- in works participation directly ;
- proposal given to arrange of watertightness of TS2 compartment (PR4p53) ;

CR9. Trials in electrical laboratory a huge number of small electrical items/components . Methods of repair , trials discussed . Works performed .

DRY DOCK MAINTENANCE

1. 15 ton MAN dock side crane (PR2pages17,22,24,27,29)
Monthly inspection of technical condition .
Assistance and supervision during repair works on crane .
Maintenance plan preparation .
Geometry of crane superstructure check .
Luffing ropes inspections :
 - ropes of approx 20 m length were damaged ;Ropes renew and load test performed .
Daily duties of crane operator prepared as follows :
 - duties before start of crane work ;
 - duties after completion of daily crane work .
2. 40 ton Metalna dock side crane (PR3page48;PR6p48)
Inspections of crane have been performed .
Supervision of repair works .
Explanations given to working team on subjects :
personal safety equipment (safety belts , helmets ,
safety shoe) and basic rules during work performance
on high level above ground .
Maintenance and inspection plan have been prepared .
3. 15 ton Metalna jetty crane
Inspection of crane have been performed .
Maintenance and inspections plan have been prepared .
4. 50/15 ton DIA jetty crane
Inspections of crane have been performed .
Maintenance and inspection plan have been prepared .
5. Overhead/workshop cranes nos 14
Inspection of runways , travelling and hoisting mechanisms .
Special attention have been paid on using proper
auxiliary lifting appliances (like auxiliary ropes ,
their proper application etc.) .
Preparation and handed over to CDD papers on following
subject :
 - technical requirements for auxiliary transport
facilities ;
 - range of typical yearly technical inspection of cranes ;

- definitions of steel ropes/cables damages .
- 6. Fire , dock auxiliary pumps nos 2 (PR4page17)
 - Inspections have been performed .
 - Periodical maintenance have been carried out .
 - Repair works supervision have been performed when necessary . Special attention have been paid during fitting on working place .
 - Maintenace works are to be performed periodically :
 - oil temperature (greasing and cooling oil of bearings) check mx 65 75°C check daily ;
 - oil replacement after 2000 working hours or each 6 month ;
 - oil level check and filling weekly / if necessary .
- 7. Main dewatering pumps of dock nos 3
 - Inspections during pumping operations .
 - Oil temperature check (suggested temperature to be maintained 40 65°C , bearing inspection necessary in case of higher temperature).
 - Oil replacement after 2000 operational hours or each 6 month .
 - Oil level check before each start of pump .
 - Inspection of thrust/carrier bearing to be done when oil temperature too high .
- 8. Bilge and drainage pumps (dock auxiliary pumps) nos 8
 - Inspections have been performed periodically . (PR4page10)
 - Supervision during repair works .
 - Inspections of greasing and cooling water instalation .
- 9. Capstans nos 4
 - Inspections and necessary maintenance works have been performed subsequently .
 - Attention have been paid on safety rules during docking operations .
- 10. Main , floating gate of the dock (PR4page37)
 - Inspection of main gate and description of necessary repair works .
 - Safety procedures to be applied during docking works and during works in the dock .

Lecture materials have been prepared and the following subject were discussed :

- fire hazards during works in the dock ;
- fire protections during works on vessel in the dock ;
- safety rules - ways of fast evacuation of poeple from the ship when fire hazard appear ;
- sufficient earthing of the ship hull during her stay in the dock .

11. Docking and undocking operations (PR5page34;PR6page50)

Technical assistance during docking and undocking of vessels . Discussions and explanations given to due staff regarding organisational regulations are to be followed/ maintained during docking , repair works onthe ship and during undocking operations .

12. Special type docking procedures (PR6pages47,48)

Technical assistance and examinations plans for docking during preparatory works .

HYDRAULIC SYSTEMS

- H1. Repair workshop of power hydraulic systems. (PR1p26)
- a) Proposal was given to arrange department in charge of hydraulic repair works and advised to procure necessary tools, equipment and also about environment requirements were given.
 - b) Preparation of operational scheme regarding typical process of hydraulic systems repairs.
- H2. Training regarding graphical symbols and drawings reading of hydraulic systems. (PR3p28)
- H3. Bilge block system. (PR2p15;PR5p23)
- Performance of systematical inspections and maintenance of hydraulic cylinders.
Inspection of piping line.
Inspection and maintenance of hydraulic set:
- oil pumps;
 - control blocks;
 - hydraulic accumulators;
 - oil tank;
 - oil filters;
- H4. Penstocks/auxiliary sluice gates. (PR2ps12,20,34)
- a) Inspection during operation;
 - b) Inspection of hydraulic set and equipment:
 - oil pumps,- control blocks,-oil tanks,- oil filters;
 - c) Sketch of technical documentation prepared regarding new piston rod fabrication;
 - d) Fabrication of stainless steel piston rod for right side sluice gate;
 - e) Repair of self-aligning bearing connecting piston rod and enstock;
 - f) Adjustment of hydraulic system;

H5. 250 T Frame bender. (PR4p32)

- a) Repair of hydraulic cylinders:
 - measurements;
 - verification of packings;
 - cleaning of hydraulic system;
 - final adjustment;
- b) Training on:
 - methods of taking measurement;
 - filling up of measurement sheet;
 - setting of clearances and verification of packings;

H6. Fork lifts. (PR6p9)

- a) Repair of hydraulic system;
- b) Training on subject: single side and double side driven hydraulic cylinders;
- c) Repair of gear pump of medium pressure;

H7. Twin, electro-hydraulic crane of M.V.B/Kakoli. (PR3p26)

- a) Performing of maintenance and repair works:
 - removal of external leakages;
 - adjustment of low and high pressure systems;
 - adjustment of drum and disk brakes;
- b) Practical training of Ship-repair Dept. employees about:
 - hydraulic on-board systems;
 - basic safety rules during working high above the ground level and on high pressure systems;

H8. Steering machine of M.V.B/Svapna. (PR4p20)

- a) Sketch for repairing of damaged steering machine was prepared where particular technical documents were not available;

- b) Technical drawings of steering machine and necessary equipments for repairing the same;
 - c) Preparation of working sequence during repairing;
- H9. Custom patrol boats P.B. Shafen and P.B. Shamika.
(PR3page46;PR6p.24)
- a) Inspection of electro-hydraulic steering machines along with CDD staff prior to repairing;
 - b) Repair of electro-hydraulic steering machine:
 - repair of hydraulic cylinders;
 - cleaning of system and oil filling;
 - final adjustment after completion of repair works;
 - c) Explanations given and training of employees on:
 - adjustment of rudder swing according to ship documents and technical manuals;
 - timing of rudder side to side turning;
 - checking of mechanical and electrical indicators measuring rudder angles;
- H10. Portable, compressed air driven water pumps. (PR4p39)
- a) Repair of sliding type distributors;
 - b) Sketch of new shafts to be fabricated was prepared;
 - c) Replacement of rubber diaphragms;
 - d) Training on:
 - sliders clearances
 - lapping of sliding elements
- H11. Hydraulic scaffolding - maintenance of hydraulic system.
(PR6p.28)
- H12. Hydraulic, plunger type steering machine of M.V. Loyal B.
- a) Inspection along with CDD staff performed prior to repair;
 - b) Range of repair works estimated;

DIESEL ENGINE WORKS

DE1. Compressor driving diesel engines. (PR1p33; PR2p18,23; PR3p33)

- a) polishing of crank shaft journals
- b) replacement of piston rings
- c) axial clearance setting of oil pump
- d) checking and regulating of injectors
- e) clearance setting of valves
- f) lapping of valves

Practical training on:

- measurement of crank shaft journals wear and ovality;
- measurement of cylinder liners wear and ovality;
- measurement of piston wear;
- measurement of piston ring wear;
- practical use of precision measuring tools;

Periodical maintenance programme have been prepared.

DE2. Auxiliary generators driving diesel engines.
(PR2p19,21,36)

- a) preparation for start up;
- b) carrying out periodical maintenance;
- c) checking of parameters during operations according to operational manual;
- d) preparation of periodical maintenance schedule;

DE3. Injector test bench. (PR1page49)

Repair of damaged test bench was carried out:

- manual honning of cylinder and replacement of piston;
- fine grinding of non return valve;
- replacement of valve springs;

Instruction of personnel on the use the bench.

Practical exercises:

- setting of injection pressure;
- measurement of the fuel jets angle;

Special attention was paid to the environment (separate and clean compartment) and also to safety rules during bench operations.

DE4. Heat exchanger. (PR1page37)

Stainless steel heat exchanger was manufactured by CDD and was found leaking upon testing.

- a) suggestions were given to expand the tubes in the holes of screen walls instead of welding;
- b) alternative design was given to the Yard;
- c) the pressure test programme was established for fabrication purpose and for final tests;

DE5. Periodical inspection of turbochargers of M.V.B/Swapna (PR3p55)

Instruction of Ship-repair Dept. personnel on the principles of turbocharger operation and also on the manufacturer's operational manual.

Range of activities during periodical inspection. Measurement of axial and radial clearances of rotor shaft bearings and measurement of radial clearances of turbine and compressor rotors.

DE6. Main engine of trawler boat. (PR4page26)

- a) adjustment of valve clearances;
- b) adjustment of fuel injection timing;

DE7. Main engine of M.V.Karin Kafco. (PR6page31)

- a) repair of cylinder heads:
 - cleaning of heads;
 - lapping of suction and exhaust valves;
 - fine grinding of surface between engine frame and cylinder heads;
 - performing of hydraulic tests;

- b) repairing of lubricating oil cooler;
- c) adjustment of fuel injection timing;
- d) adjustment of valves' clearances;

DE8. Patrol boats of Customs. (PR3page46)

Inspection before repair works.

Suggestions on controlling fuel leakage to lubrication oil system (auxiliary generator driving engine).

DE9. Hydraulic scaffolding engines - maintenance.

DE10. Fork lifts engines - maintenance.

Works performed under supervision and with advices of hydraulic and diesel engine specialists.

CW1. Broken joke of guillotine repair. (PR1page45)

Technical documentation for repairing technology was prepared and the repairing work was supervised.

CW2. Air compressor repair. (PR1page30)

- a) Screw pump of compressor and gear pump of lubrication oil were under repair:
 - grinding of face surfaces of air pump screws;
 - axial clearances adjustment of air pump and lubricating oil pump;
 - replacement of ball bearings of air pump;
- b) Training of Maintenance Dept. employees on fitting methods of different types bearings;

CW3. 15 T MAN dock side crane. (PR2page27)

- a) Coupling of slewing mechanism:
 - replacing of used synthetic sleeve of claw coupling;
 - discussed the use of substitute materials like leather, rubber of suitable hardness;
 - training on hardness scale according to Shore;
 - training on rubber hardness measurement using proper equipment;
- b) Slewing braking system: (PR2page27)
 - deaeration of hydraulic braking system;
 - adjustment of clearances between brake shoes and drums;

c) Pins of travelling boggies: (PR2page39)

- removal of seizing;
- polishing of pins;
- measurement of clearances of joints;

d) Broken bolts of slewing mechanism: (PR2page29)

- removal of broken bolts from teeth rim;
- dynamometric test of tightness of all bolts by torque wrench;
- training and explanation to employees on different ways of broken bolts removal;
- training on way of using and purpose of torque wrench;
- training on scale calculation of torque wrench (kg*m,N*m,lb*ft);

CW4. 40 T Metalna dock side crane. (PR3page48)

a) Sleeve type coupling of travelling mechanism:

- preparation of technical documents in order to fabricate the new coupling sleeves in Machine Shop Dept.;
- fabrication of new keys and coupling reassembling;

b) Overload type coupling of slewing mechanism:(PR6page42)

- preparation of technical documents in order to fabricate spare parts;
- adjustment of overload torque value;

CW5. Bilge pumps of dock. (PR4page10)

a) Preparation of technical documentation for repairing of pumps and their driving system;

b) Determining of proper clearances values for:

- pump bearings;
- intermediate bearings of driving shafts;
- axial and radial clearances of pump impellers;

- c) Attention was paid to use proper method for shaft journals machining in respect of radial motion/run out;
- d) Explanation of alternating way of repairing of damaged pump housing (synthetic resins instead of face welding);

CW6. Fire pumps of dock. (PR4page17)

- a) Preparation of technical documents in order to fabricate the rotor shaft and keys;
- b) Replacement of bearings;

CW7. Cast iron gear housing. (PR5page29)

Repair document prepared and substitute of face welding technology explained. The part to be repaired was vastly corroded and saturated with chemicals what made repair by welding impossible.

CW8. Two stage water pump. (PR5page32)

- a) Verification of worn out parts of pump;
- b) Repair by face welding of worn out rotors;
- c) Replacement of rotor shaft and bearings;
- d) Attention was paid to maintain proper values of axial and radial clearances of pump rotors;
- e) Method of shaft packing was explained;
- f) Range and timing of periodical inspections and maintenance settled, which was not maintained by Maintenance Dept.;

CW9. Verification of roller bearings. (PR3page79)

The followings were explained to Maintenance Dept. employees:

- a) Basic rules of roller bearing verification;
- b) Determining of wear down;
- c) Proper methods of fitting and disassembling;
- d) Suggestions were given in connection with exploitation of roller bearings in CDD;

CW10. Procedure of coupling alignment. (PR3page82)

Practical training and explanations given in respect of alignment procedures of electrical motors and diesel engines coupled to pumps.

Attention was paid on value of permissible axial and radial displacement of shafts. Displacements beyond permissible value will cause faster wear and tear of bearings and equipment.

Fabrication of edge gauge suggested which is necessary for alignment checking.

CW11. Repair works of M.V. Al-Tabith, M.V. Al-Swamruz, M.V. Pearl One. (PR5page9)

Shaft line and rudder repair works were performed:

a) Measuring works:

- drop of shafts, - drop of rudders, - clearances of shaft bearings and stuffing boxes;

b) Verification works:

- bearings, - shafts journals, - stuffing boxes;

c) Dismantling and reassembling works:

- propellers, - propeller shafts, - bearings, - intermediate shafts;

d) Repair works:

- shaft journals, - shaft packings Simplex type;

Lecture materials preparation (for Ship-repair Dept.) on subject: shaft line repair works.

CW12. Sea valves repairs. Vessels as per CW11. (PR5page21)

- a) Fine grinding of seats and valve heads;
- b) Renewal of stuffing box gland packings and gasket seals;
- c) Hydraulic tests performance;
- d) Maintenance works;
- e) Preparation of lecture materials;

CW13. Three navy vessels. (PR6page26)

- a) Repair of damaged tail shaft bracket;
- b) Preparation of repair documents;
- c) Giving of alternative methods of bracket repair;
- d) Renewal of rubber sleeve and rubber inserts of propeller shaft bearings;
- e) Measurement of bearing and stuffing box clearances;

CW14. Gear box housing.

Giving of alternative methods for repairing of damaged bearing seat:

- by resin application;
- by machining and rings fabrication;
- proposal of different method of machining;

CW15. Rudder measuring and repair works of M.V. Loyal Bird.
(PR6page28)

- a) Operational inspection of hydraulic system;
- b) Preparation of measuring sheet;
- c) Measurement of rudder bearings clearances;
- d) Rudder disassembling and repair of the bearing;

CW16. Shaft line and rudder repairs of F.V. Ahm, F.V. St Gousel.

- a) Disassembling works of rudders, propellers, shafts and stern tube sleeves;

- b) Measurement of bearing clearances;
- c) Renewal of propeller shaft sleeves;
- d) Machining of Lignum Vitae stern tube sleeve;

WELDING

W1. TIG Welding machine

The machine did not work for higher current range even though all the related power sources were connected .

Checked :

- working of welding machine ;
- compared the power parameters with the parameters given in the technical manual ;

Conclusion :

- electrical power is alright ;
- argon loading is alright ;
- very low pressure of transformer cooling water ;

Suggestion :

- water line should give proper water pressure ;
- noted on the quality of supplied water , suggested to supply better quality (clean) water ;
- suggested to make provisional water tank for supplying to welding machine .

Suggestions were accepted .

W2. Repairing of propeller (PR1page20)

There are some propellers in the Yard for repairing .

Following works had been carried out :

- Discussed the technology for preparation of propeller for repairing in accordance with PRS and LRS ;
- Discussed the method of defining the damage extent of propeller ;
- Discussed the method of measuring the propeller shape ;
- Discussed the welding of propellers and stress relieving of materials after welding ;
- Discussed the final treatment of repaired part and static balancing of the propeller .

The item was treated theoretically . Observed propellers , automatic welding machines , materials and other machineries necessary for propeller repair .

W3. Trial repairing of a propeller

Provided practical training as :

- straightening of curved blade tip ;
- cutting of broken surface ;
- welding with suitable technology and sequence .

Trial was successful .

W4. Preparation for repairing a propeller

Discussed aspects in details and also the practical and organisational matters related with repairing of propeller .

Preparatory work schedule was prepared .

The work was partly accomplished .

W5. Commissioning of submerged ARC welding M/C

Preparing the machine for welding , preparing the welding material , starting the M/C , training of welders , welding of plates of different thickness .

Following works have been carried out :

- theoretical discussions on :
 - preparation of plates for welding ; (theoretical materials were given to interested CDD engineers) ;
 - setting of welding parameters and selection of wire diameter depending on plate thickness ;
- collection of technical data from manufacturers concerning welding materials ;
- conducted trial welding using welding materials available in the Yard .

W6. Commissioning of MIG welding M/C

This a semiautomatic welder used for arc welding under the cover of inert gas (argon) .

Following works were done :

- technical inspection of the welding m/c ;
- theoretical materials were prepared on preparation of plates for welding ;
- prepared specimen for welding ;
- conducted starting of the machine ;
- conducted quality control for weldments of welders ;
- conducted additional lectures .

W7. Cooling water tank for TIG m/c in fabrication shop

Following works were carried out :

- calculation of dimension of the tank to meet the requirement of coolant ;
- calculation of the tank's height to ensure necessary water pressure ;
- participation in making the tank .

Emphasised on :

- filling up system of tank by good quality water ;
- anticorrosive coating to safe the welding m/c from dirt .

W8. Commissioning of TIG welding m/c

It is manual arc welding where arc is produced between non-consumable tungsten rod and base metal under the cover of inert gas . Range of work included theoretical discussions and on job training .

Following works were carried out :

- conducted trial welding of stainless steel pipe ;
- demonstrated the effect of welding by correct and wrong parameters and also in case of flow of different amount of argon gas ;
- discussed the preparation of electrode and demonstrated the sharpening of tungsten rod ;
- conducted training of 1 (one) welder who is supposed to work by this m/c .

W9. Repairing of pump body (PR5page32)

The subject cast iron pump body was repaired by surface welding with preheating .

- prepared the working schedule , discussed the welding technology ;
- the element to be repaired was preheated ;
- worn out surface was gas welded using cast iron sticks (used damaged piston rings) ;
- ensured slow cooling ;
- sent for machining to required size and dimension .

Utilised the experience of welder , general experience of pipe fitter and the mechanic .

W10. Repairing of cast iron casing of buhr mill by welding without preheating

Proposed to repair the worn-out surface by inserting sleeve . The Yard decided to repair by surface welding . Because of the huge size of the casing , it was decided to weld without preheating . Followings were done :

- discussed welding method without preheating applicable to this work ;
- underlined the necessity of proper surface preparation for welding ;
- requested to pay attention to :
 - drying electrodes before welding ;
 - requirement for using necessary electrodes of small diameter and small current ;
 - requirement of welding of short lenght in different places of welding surface , so that the weldment was not over heated ; allowing of proper cooling time .

Repairing effect was satisfactory .

W11. Using steel electrodes for cast iron welding (PR6page51)

In the process of repairing the teeth of cast iron guillotine attention was drawn to the possibility of welding of cast iron by steel electrodes . The subject was discussed theoretically , sketches was prepared and conducted the trial welding .

W12. Training for gas welding to right and to left (PR6page54)

On-job-training was conducted . Introduced principles of both methods and their differences among welders . Conducted trial welding by selected welders .

W13. Repair of cast iron jaw of guillotine for shearing steel sheets (PR1page45)

Proposed repairing by welding without preheating and strenghtening of jaws by steel inserts . Work was done satisfactory . The serious problem was to encounter that the material was imbued with oils .

W14. Renewal of hull plates of MV Bangla Asha (PR2page52)

Renewed approx 80 ton of plates at the bottom part of the vessel . Expert was directly engaged for supervision of the works and also worked with welders and engineers of CDD . Attention was drawn on following subjects :

- the existing process of cutting off plates from hull and throwing away scraps to the dock floor , storing scraps in the dock or vertical transport of scrap is wrong and unacceptable from the view point of safety ;
- wrong working clothes of welders and lacking of their basic outfits like hammers , wire brush , safety shoes etc. - which endangers their health and life also limits the effectiveness of their work ;
- wrong method of cutting surplus materials in the region of longitudinals and frames ;
- wrong method of preparation of new materials for assembly (bending of plates , edge preparation and edge cleaning) ;
- wrong method of assembling plate to the hull (clamping and tack welding) ;
- bad quality of overhead welds .

The work was completed during the whole period of the vessel in the dock .

Conducted : - proper process of welding ;
- clamping and tacking .

It was necessary to arrange proper theoretical materials related to above subjects .

W15. Trial of welding of Aluminium by TIG (PR4page43)

Conducted following works :

- theoretical lessons on :
 - edge preparation ;
 - welding parameters ;
- practical training of 1 (One) welder supposed to work on this m/c .

Attention was drawn to the fact that max 2 to 3 welders may work with same m/c . Casual or untrained welder should not work with the machine .

- W16. Theoretical materials on "Preparation of plates for welding and procedure of tack welding" (PR2page53)
Appropriate material was prepared in English on technological instructions prevailing in Polish shipyards and basing on experiences of the Expert .
Materials delivered to related engineers of the Yard .
Conducted discussions to explain the material to engineers and workers .
- W17. Welding of components made of Aluminium
Work order for repairing of aluminium hand rails of a Patrol Boat Shafen (using MIG) was received by the Yard . Disassembles the damaged elements , carried out repairing in the shop , reweld the railing to the deck .
The works was done along with the welder of CDD .
Problem arose during welding/assembling on the vessel .
Attention was drawn to proper and thorough cleaning of aluminium before welding . After thorough surface cleaning , it was possible to reweld .
- W18. MV Banglar Kakoli (PR3page16)
Renewed approx 50 tons of steel plates at the bottom part of the vessel . The type of work and it's specification is similar to that of no "W14" however in a higher range . During welding , occured significant difficulties in the form of cracking of weldments .
Assumed following reasons for that :
- not following the proper welding technology required for this type of work ;
 - quality of welds ;
 - improper welding sequence and lack of relaxation of the material ;

- lack of proper workshop documents to prepare for this type of ships .

Conducted following preventive measures :

- testing of welders (making of specimens , periodical checking of specimens) ; Also radiographic checking was suggested , which was not followed by the yard ;
- controlling thoroughly the repairing welding technology .

Conducted direct supervision of all works (along with CDD engineers) through the period of repairing .

It was indispensable to prepare proper literature and theoretical training .

- W19. Preparation of theoretical materials on subject :
"Principle of welded joints" (PR2page55;PR3page17)

The materials were prepared in English , copied and supplied to interested engineers of CDD . It was ensured that the materials were discussed in the shop and compared the theoretical materials with the result of practical works . Basis of materials was the technological instructions used in the Polish shipyards and the experiences of the expert .

- W20. Welding of bronze alloys

Discussed theoretically problems related to welding of bronze alloys as followings :

- using of proper welding m/c ;
- selection of proper welding materials ;
- surface preparation for welding ;
- negative effects of joining alloys of different chemical composition .

- W21. Bilge pump : repair of damaged covering pipes by cast iron welding without preheating (PR2page62)

Repaired broken covering pipe of shaft of bilge pump . Proposed method was to repair by pressing steel sleeve , which was not adopted by the Yard . The tube was repaired by welding without preheating .

- W22. Face welding of worn-out surface of wheel of 15 ton
MAN dock side crane (PR2page37)

The Yard requested to assess the reason for which the side surface of the wheel of the crane was excessively wearing out .

One of the suggested works was to face welding of worn-out surfaces and machining it to the size . Utilised usual carbon steel rods . The work was supervised . Attention was drawn to technical conditions and technology of welding . Four wheels were repaired .

- W23. Driving shaft of 40 ton Metalna dock side crane
repair by welding (PR3page48)

Grove of the transmission shaft was damaged due to failure of coupling . The shaft is made of machinery steel . Suggested to fill up damaged surfaces and machine the groove in new place . Supervised the welding works and discussed . The work was completed satisfactorily .

- W24. Keel and bilge blocks - repair by welding

Eight numbers of blocks was required to be repaired by welding . Discussed the welding technology of thick plates . The work was done in a very long period and supervised along with CDD engineers .

- W25. Construction of floating pontoon (PR3page61)

A pontoon of dimension approx 15 x 3 x 1.7 m*m*m was designed and fabricated for using as floating foundation of pumps to be used for emergency pumping out of water from dock after the devastating cyclone .

Proposed :

- subdivision of pontoon into water tight blocks ;
- using of additional stiffeners not included in design ;
- technology of welding works .

The work was supervised along with CDD engineers .

W26. Long pipes (PR4page41)

Work order for joining of 45 nos mild steel pipes of diameter 0.95 m by welding . Initially difficulties arose in formation of weld of required quality .

Concluded that :

- used electrodes of bigger diameter comparing to the dimension of the gap ;
- used wrong welding current .

Proposed :

- selection of proper electrode ;
- preparation of edges ;
- welding procedure .

Conducted :

- controlling of welders ;
- welds were checked by ultrasonography ;
- supervision along with CDD engineers .

W27. Problems related to gas cylinders

Method of storing , transporting and services of gas cylinders was determined as not acceptable from the safety point of view .

Suggested :

- changing of storing method of full and empty gas cylinders ;
- introduction of marking cylinders with colours depending of the gas ;
- covering the cylinder valves ;
- vertical and horizontal transport inside the Yard must by carried out in the carriage ; The construction of carriage was proposed ;
- ensuring of proper exploitational position of cylinders;
- it is not allowed to empty the cylinder below minimal pressure .

Concerned was informed , however suggestions were not realised .

W28. Duplicating pantograph (PR3page53)

The work consist of starting the automatic cutter for cutting small shapes from steel plates by oxy-acetylene torch . Supervised cleaning and starting the m/c .
The work was not completed due to worsening the condition of the m/c during the cyclone .

W29. Welding equipment recommissioning

Checking of properness of 30 nos welding transformers after cyclone .

W30. Zinc bath (PR4page52)

Work order for crack repairing of the bath was received by the Yard . Initially the repair of thick high strenght steel plates was tried by the owner . However the expected result was not achieved . Proposed the welding technology and selection of parameters . Supervised the welding works . Simultaneously , supervised fabrication of a new zinc bath .

W31. Plasma cutting of stainless steel

Supervised the cutting process of stainless steel plates . Initially appropriate quality was not achieved . Selected the parameters of m/c relating to the plate thickness . Conducted inspection of the m/c , replaced damaged reducer , positive results were achieved . Conducted discussion with the worker engaged in working with this m/c .

W32. Propellers repair

Repair of two propellers was carried out with assistance and direct help of expert :

- 8 ton Manganese Bronze propeller of MV Loyal Bird ;
- 12 ton Manganese Bronze propeller of MV B/Bani .

Technology and particulars were explained .

Electrical works

E1. Oven maintenance

The main task was to repair damaged system of temperature controller fitted in the oven .

Inspection result/output :

- electronical controller was not designed as tropicalised ;
- so that was damaged by moulds/funguses ;
- during storing the mechanical parts of controller were damaged .

Repair was not possible due to lack of technical documentation and due to the range of damages .

The following was suggested :

- to collect suitable manufacturer's documentation in order to perform repair works :
- to purchase of suitable tropicalised version of controller .

The operational principles of such type of controller were discussed on theoretical and practical way .

E2. Duplicating pantograph (PR3page53)

Particular schedule of maintenance and commissioning of equipment was prepared in co-operation with CDD Electr. Dept and discussed . The following jobs were performed and completed :

- cleaning and maintenance before commissioning ;
- calibration of electromechanical parts ;
- trials of different parts and systems such as :
 - electric supply system ;
 - lighting of working field ;
 - travelling (parallel and perpendicular) systems ;
- start up of manual operation mode .

Operation in automatic mode was not possible due to additional damages after cyclone .

E3. Substation equipments

Three electrical substations of both , medium and low voltage (11kV and 380V respectively) were included to the range of inspections and maintenance works .

- transformers ;
- 11kV switchgears ;
- 380V switchboards ;
- energetical , control and signal cables ;
- systems built in cabinets and switchboards .

The following works were suggested as to be performed :

- cleaning of structure from dust and other dirt ;
- inspection of main contacts (circuit breakers and contactors) ;
- tightening of all bolt and screw type electrical connections ;
- renewing of damaged elements / ensure of completeness of equipment ;
- during operation inspection of all built in systems ;
- "have a look" inspection which are to be performed frequently ;
- trials of different tripping / protection systems such as :
 - overcurrent protections ;
 - short current protections ;
 - overvoltage and undervoltage protections ;
 - overfrequency and underfrequency protections etc;
- measurement of earthing resistance ;
- efficiency check of antielectric shock protections .

Most of the jobs were performed . Some of them are not possible to be carried out by CDD due to lack of spare parts , lack of suitable equipment or shortage of services to carry out specific jobs .

E4. 50/15 ton DIA jetty crane - maintenance

Inspection plan for crane equipments was discussed and prepared . Maintenance jobs were performed of control cabinets . Some ad-hoc emergency jobs were carried out .

E5. Auxiliary generators - maintenance

The following works were carried out :

- maintenance and overhauling of generators and control systems ;
- parameters adjustment of tripping and control systems

(theoretical discussion , explanations , job performance) ;

- typical schedule / procedure of trials of generator was prepared ; short term trials were performed ;
- trouble shooting manufacturer's manual was ordered and delivered to CDD ;
- advice was given to fit additional filter (to clean the air cooling windings of generator) ; sample of suitable (common in marine equipment) material was delivered .

E6. Inspection of electrical equipment around the dock

Inspections of dry dock electrical equipments were carried out together with CDD staff members . In this connection the following equipment were inspected :

- capstans nos 2 ;
- windlass nos 1 ;
- sluice gate/penstock nos 2 ;
- dock side cranes nos 2 ;
- bilge block system ;
- cable lines around the dock and in the dock base ;
- substation TS2 compartment and pump house .

Several works were suggested . As example :

- fitting of cables in suitable brackets where necessary ;
- cleaning and providing anticorrosion protections for outdoor boxes ;
- ensure of general order , fitting arrangements etc ;
- providing operational and other tests of systems .

The necessary jobs were performed permanently .

E7. Commissioning of different welding equipment

Each item of welding equipment prior to commissioning by welding team had undergone special maintenance work by Electrical Dept. in order to ensure proper operational state/condition .

E8. Calibration and adjustment of various electrical meters and relays

It was clearly shown during particular inspections of equipments that the following is necessary to explain and discuss :

- types of various relays involved in different control operations ;
- methods of check and adjustment ;

The following works were performed after prior theoretical discussions :

- power factor correction system ;
- electric power measuring system ;
- various voltage measuring systems ;
- current measuring systems ;
- follow-up systems ;
- thermo switches and pressure switches .

E9. Repair and method of trials of various substation equipment

Repairs and maintenance of substation equipment and systems were carried out . The laboratory tests of the following equipments were performed and discussed :

- CT and VT measuring transformers ;
- light powered transformers ;
- intermediate and auxiliary relays ;
- time relays .

Special attention was paid to perform all trials and examinations in laboratory but not on the place/system where components normally works . Such trials are to be performed by means of simullations in order to :

- ensure easy access to equipment to be tested ;
- ensure possibility of variation of specific parameters without engagement of many people and big power to drive original big system during trials ;
- ensure necessary safety measures in case of failure of equipment to be checked or people mistake .

E10. Marine automatic systems : range of works , system's design , methods of work performance commented
In spite of lack/shortage of electrical repairs performed by shipyard , it seems to be necessary to prepare lecture papers on subject of various marine electrical systems . The following subjects were mentioned :

- steam producing/auxiliary boilers ;
- main engine auxiliary equipments ;
- auxiliary engine electrical equipments ;
- starting air - compressor's system ;
- cooling/heating water temperature control system ;
- control systems for different pumps of engine room ;
- control and monitoring systems of different engine room parameters ;
- warning system of engine room ;
- electric equipment of electric plant etc .

Suitable papers were prepared in English and handed over to Electric Dept. The following problems were discussed in connection with papers :

- design of system ;
- typical damages ;
- ways of repair ;
- and also way of out fitting on new buildings .

E11. Proposal of rearrangement of electrical laboratory room
The present equipment of electrical laboratory is to be expanded with several items in order to prepare it more functional and usefull . The following additional arrangements were discussed :

- suitable amount of store shelves ;
- suitable amount of various hammersmith tools ;
- suitable soft board against the wall for notes and informations ;
- blackboard for internal training purpose and also usefull to give explanations for fitters ;

- shelf for handsome technical and manual library ;
- insulating cover of working table ;
- arrangement of several suitable electrical sources of both fixed and adjustable value of electrical voltages (which value are common during works performed) ;
- to separate the laboratory room from other compartment in such manner to prevent access of dust and other dirt .

E12. Rescue actions immediately after cyclone

Immediate and direct assistance was provided to CDD Electrical Dept. during first period after cyclone 29/30 of April . The following works were performed in that period :

- inspections and necessary maintenance of substations ;
- ensure substations to be ready for switching on supply from national grid ;
- preparation of temporary and emergency cable net in order to distribute electric supply between such receivers as :
 - fresh water pumps for industrial and accomodation purpose ;
 - workshop equipment necessary for rescue action ;
 - emergency lights etc ;
 - commisioning and supervision of auxiliary generator operations ;
 - preparation of cranes for recommissioning ;
 - preparation of rehabilitation works plan .

E13. Help during subsequent rehabilitation works

The long period of primary rehabilitation works covered several weeks . The following works were performed by CDD Electrical Dept. in cooperation with expert :

- preparation of temporary distribution electrical network in order to supply with electricity workshop and all equipments necessary to perform normal production activities .

- disassembling of equipments of TS2 substation which was flooded with saline water ;
- discussion of possible repairs and restoring of equipments ;
- method of repairs has been advised ;
- participation in repair / overhauling works of almost all electrical motors fitted in the Yard ;
- repair works on around dock fitted equipment such as : capstans , sluice gates , bilge block system that mean :
 - repairs in workshop ;
 - trials of control cabinets have been repaired ;
 - startup/commissioning in place ;
 - subsequently putting of those equipment into operation ;
- design works of temporary control arrangements/cabinets and electric supply lines for dock dewatering pumping system .

First cabinets were designed and built with close co-operation with expert ; the next other consisted of several modifications were built by CDD engineers according to good practice of design of such type of equipment ;

- maintenance and commissioning of machinery of fabrication shop and machine tool shop .

E14. Daily work in workshop/training on job

A number of particular , practical advices were given during daily presence and work in workshop . The very simple and more sophisticated problems were considered as examples given below :

- to shift working position from the floor level up to the table level ;
- to use proper type of knife which except the screw-driver is the main tool used by electrician so that must be simple and handfull ;
- practical use of different measurement instruments both electrical and mechanical ;

- electrical measurements and interpretation of measurement result such as :
 - electric motor/winding resistance measurement using different type of ohm meters and comments given which result may be proper and why ;
 - practical show of mistakes which are supposed to be made when simple potential indicator is used instead of volt meter or bulb indicator ;
- trial schedule for different electrical equipment and items as : contactors , electrical motors , cable etc ;
- proper way of electric connection preparation by means of bolts ;
- schedule preparation and performance of trials of complex electrical systems being under repair .

E15. Arrangements , tools , methods proposed

Number of tools , fixtures and methods were proposed such as :

- to apply the transformer soldering iron for works with electronic items ;
- to preheat the rolling bearing in order to expand them before fitting on place by means of :
 - preheating in oil ;
 - eddy current transformer arrangement ;
- hydraulic press/fixture for pressure switch adjustment ;
- fixture/arrangement for periodical test of auxiliary relays ;
- high powered water resistor/load for generators and transformers load tests ;
- chemicals suggested to be used for cleaning purpose of electrical switchboards , contactors etc ;
- proposal of specific method of cleaning of electrical motors .

E16. Permanent co-operation with other Team members

Permanent co-operation with other Team members was maintained because most of works were performed by combined team of mechanical and electrical specialists of CDD and Team .

E17. Electrical equipment stored in Main Store

Periodical inspections of those equipments and also spare parts was mostly suggested in order to ensure it's good state and condition during long term storage .

The following periodical works are necessary :

- cleaning ;
- start up and short term work (specially welding equipment) ;
- disassembling and ensure of proper storage conditions .

E18. Technical library of manuals and suitable register of electrical equipment

The existing file of technical documents and manufacturer's manuals seems to be not properly organised . So that recovering of necessary document is difficult and sometimes impossible . It was suggested to arrange suitable service involved in :

- collecting and keeping documents in order ;
- registration of machinery and equipment giving specific internal/shipyard number ;
- storing and issuing the copies (only) of documents on request ;

No original document may leave such library . Some works on this were performed by Electrical Dept.

E19. Electrical works have been performed on board the ships

- MV B/Kakoli :
 - twin crane operation adjustment and calibration ;
 - electric parameter measurement systems calibration :
 - active power measurement system nos 3 ;
 - exciting current measuring system of generator nos 3 ;
 - phase current measuring system of generator nos 3 ;

Specific methods were involved , discussed and utilised due to specific design of each particular system ;

- CPB Shafen :
- estimation of works range ;
- electrohydraulic steering system repair ;
- works and trials programme prepared and discussed for this system ;
- main engine starting and monitoring system :
 - preparatory works and discussion ;
 - range of works estimated .

E20. Maintenance programme for electric equipment of dockyard
Proposal of maintenance programme specific for electric equipment was prepared . Some examples for particular items of equipment have been prepared . Schedule for periodical for several items of equipment was prepared . Those are on the basis of expert experience and on the basis of Polih Code only , due to lack of proper technical documentation .

E21. Papers and technical informations

Number of papers and informations was prepared and handed over . As for the face to face discussions were no linguistic and professional problems , but technical informations were not available neither in english nor in bangali so that preparation in english was necessary .

ACTIVITY REPORT
OF
TRAINING OFFICER/PROJECT CO-ORDINATOR

- 1/ IX, X, XI - The organizationally-initial activity of the contract in Dry Dock Chittagong
- 2/ 03.12.90 - 08.12.90 - Briefing in Vienna International Centre
- 3/ Missions to Bangladesh:
 - I - 08.12.90 - 14.12.90 - 7 days - Chittagong /2 days in Dhaka/
 - II - 19.03.91 - 27.03.91 - 9 days - Chittagong
 - III - 07.08.91 - 13.08.91 - 7 days - Chittagong /1 day in Dhaka/
 - IV - 18.11.91 - 27.11.91 - 10 days - Chittagong /1 day in Dhaka/
- 4/ Leading conversations and co-ordinations with CDD Management.
- 5/ Meetings with UNDP and the government representation.
- 6/ Organizing of Bangladesh visas.
- 7/ Organizing of airlines tickets.
- 8/ Being in contact with UNIDO - Vienna International Centre.
- 9/ Being in contact with UNDP - Bangladesh, Dhaka.
- 10/ Keeping contacts with team's families.
- 11/ Keeping contacts with team in CDD.
- 12/ Keeping contacts with Gdańsk - Shipyard as the contractor.
- 13/ Keeping contacts with Ministry of Foreign Affairs.
- 14/ Sending the progress reports to UNIDO - V.I.C.
- 15/ Sending the invoices to UNIDO - V.I.C.
- 16/ Co-operation with Contracts Section Department of Administration.
- 17/ Co-operation with the Creditanstalt Bankverein V.I.C.

- 18/ Keeping on phone communication, fax, telex and correspondence with UNIDO, UNDP, CDD and the team's families.
- 19/ Taking care of all official-organizing affairs connected with the contract.
- 20/ Organizing technical materials / documentation and bibliography / for Dry Dock Chittagong and for the team, delivering documentation.

BIBLIOGRAPHY AND DOCUMENTATION

fixed, delivered and left in Dry Dock Chittagong for team and CDD technical personnel.

- 1/ Technics of workshop measurements.
- 2/ Sothern's Marine diesel oil engines.
- 3/ English-Polish dictionary of Science and Technology.
- 4/ Hints to mechanic. - Volume I, II
- 5/ Ship's diesel engines.
- 6/ Small technical English-Polish and Polish-English Dictionary.
- 7/ Technology of repair ship's propulsion plants.
- 8/ English-Polish Dictionary of Science and Technology - new terms and meanings.
- 9/ English and American business letters.
- 10/ English letters examples.
- 11/ Instruction of electric engines exploitation - Enerpetics Institute.
- 12/ Technical Polish-English dictionary.
- 13/ Lectures of electrotechnics bases. - Volume I, II
- 14/ Law and marine jurisdiction. - Volume I, II, III, IV
- 15/ Properties of systems regulation rotary speed of main propulsion diesel engines and auxiliary generators sets of the ship.
- 16/ Schematic symbols type "PLATON".
- 17/ Electricity - science copybooks of Politechnika Gdańska.
- 18/ Recomendations and equipment list for out watch work class.
- 19/ Technical terms of carrying out the main propulsion engines.
- 20/ Marine sanitation denices.
- 21/ Electromagnetic relays.
- 22/ Technical terms of carrying out current-generating sets.

- 23/ Digital Integrated Circuits.
- 24/ Welding and riveting.
- 25/ Ship's welding.
- 26/ Gassy welding.
- 27/ Electrical welding.
- 28/ Technology of weldable construction.
- 29/ Technology of aluminium alloys welding.
- 30/ Repair technology of hydraulic ship's devices.
- 31/ Building and exploitation of ships lifting equipment.
- 32/ Curriculum of general professional subjects for primary ships building school.
 - Professions: 1/ Fitter of hulls / steel worker /.
 - 2/ Fitter of machine and ship's mechanism.
 - 3/ Ship's electrician.
 - 4/ Fitter of ironworker's ship's equipment / locksmith /.
 - 5/ Fitter of ship's pipeline / pipe worker /.
- 33/ Exploitation of electro-energetic systems.
- 34/ Prevention of electric shocks in industry.
- 35/ BALTEXPO '86 Catalogue.
- 36/ Regulations of exploitation electro-energetic installations.
- 37/ Technology of welding constructions.
- 38/ Voltage regulators type RRGY - service manual.
- 39/ Viscosity Control Systems - Technical Manual.
- 40/ Oil fog detector - service instruction "GRAVINER".
- 41/ Control system and signalling parameters of the main propulsion engine work - "ZGODA" project.
- 42/ Steering instruction and specification of units automation medium revolutions diesel engines "ZGODA".
- 43/ Control system of two reversible engines, working on one propeller.

- 44/ Instruction regarding the rules of training and workers' improvement.
- 45/ Technical-manual engine control room console.
- 46/ The rules of building electro-energetic systems.
- 47/ The standard of ship's building. - Volume I, II
- 48/ Organization, fixing the number of permanent posts and documents for quality control department.
- 49/ Factory works norms for repair-ship's works - 3 volumes:
 - 1. Main engines.
 - 2. Auxiliary engines.
 - 3. Rudders and steering gears.
- 50/ Organizing-technical rules of continuation repair works.
- 51/ Navire - Mac Gregor Guide.
- 52/ Polish Register of Shipping guide.
- 53/ Small guide of mechanic. - Volume I, II
- 54/ Engine's crank shaft alignment on board the vessels.
- 55/ Pocket English-Polish and Polish-English dictionary.
- 56/ Instruction of aluminium alloys welding - TIG and MIG methods.
- 57/ Instruction of preparing materials for hand welding, half-automatic in CO₂ protection and for automatic covered arc welding, and of assembling with spot welding and clamping.
- 58/ MAX-20 - Plant for hand fairy plasma's cutting, for steel sheets till 5 mm thickness.
- 59/ Technology of ships' repairing. - Prof. J.Doerffer
- 60/ Ship's equipment.
- 61/ Ships' offer catalogues - "NAVIMOR" Foreign Trade Company.
- 62/ Multi cable transits for marine environments - BRATTBERG - Lycab.

POLISH REGISTER OF SHIPPING RULES - 20 book items

A. PRS OBLIGATORY RULES

I PRS Rules applicable to sea-going crafts.

Rules for the Classification and Construction of Sea-going Ships.

63/ Part I - Classification Regulations.

64/ Part II - Hull.

65/ Part III - Equipment and Outfit.

66/ Part IV - Stability.

67/ Part V - Subdivision.

68/ Part VII - Machinery Installations.

Part VIII - Pumping and Piping.

Part IX - Machinery.

Part X - Boilers, Pressure Vessels and Heat Exchangers.

Part XII - Refrigerating Plants.

69/ Part XIV - Electric Welding.

Rules for the Convention Equipment of Sea-going Ships

70/ Part I - Supervision Regulations.

Part II - Life-Saving Appliances.

Part III - Signal Means.

Part IV - Radio Equipment.

Part V - Navigational Equipment.

71/ Interpretations and Explanations to the International Convention on Load Lines.

72/ Rules for the Survey and Construction of Steel Floating Docks.

73/ Rules for Fishing Gear - 1981 /in Polish only/.

74/ Rules for the Construction of Freight Containers.

II PRS Rules applicable to Inland Waterways Vessels.

75/ Rules for the Classification and Construction of Inland Waterways
Vessels.

B. PRS PUBLICATIONS CONNECTED WITH THE RULES

76/ Publication No 3/P - Examination of Welders for the PRS Approval.

77/ Publication No 6/P - Stability.

78/ Publication No 2/1 - Prevention of Vibration in Ships.

D. OTHER PUBLICATIONS

79/ Compiled Text of the International Convention for the Safety of Life
at Sea.

80/ International Rules for Tonnage Measurement of Ships.

81/ International Convention on Load Lines.

82/ Information of PRS Orders and Circulars - 1981 / in Polish only /.

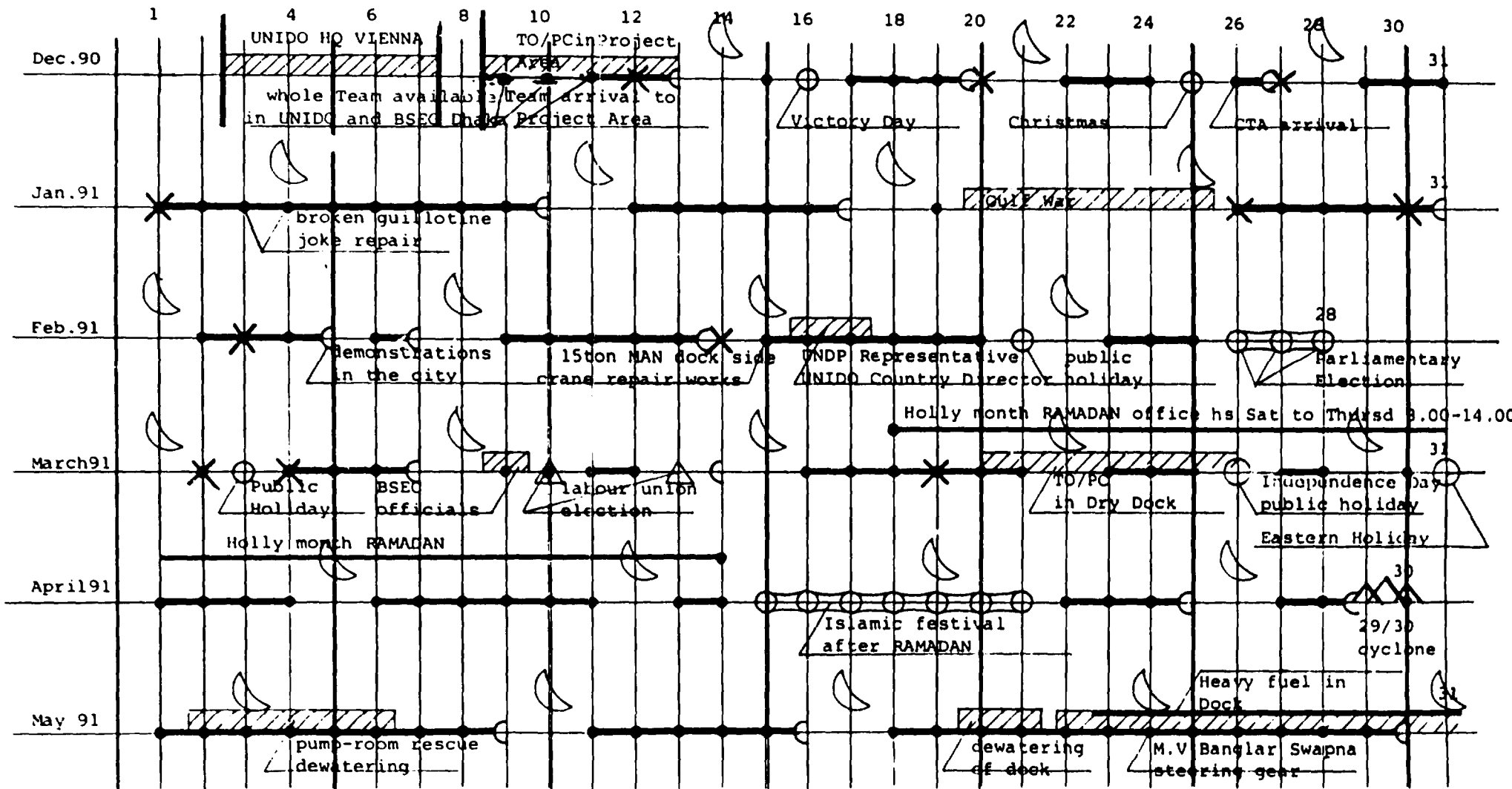
- 83/ Housing types of electrical equipment - paper
- 84/ Catalogue concerning windings of electrical motors
- 85/ Electrical equipment fitted on marine diesel engine-paper
- 86/ Proposal of maintenance programme specific for electrical equipment - paper
- 87/ Propeller repair technology - paper
- 88/ Efficiency of earthing or neutral earthing antielectric shock protection system examination - paper
- 89/ Sample of electrical outfitting documentation
- 90/ Polish standardisation code regarding steel constructions
- 91/ Lecture record of lifting appliance operator's course
- 92/ Plate's preparation for welding - paper
- 93/ Inspection schedule for lifting appliances - paper
- 94/ Principles of welded joints - paper
- 95/ Slide bearings of marine machinery - paper
- 96/ Safety rules in shipyards industry
- 97/ Professional data covered by comments given in Progress Reports

LIST of CORRESPONDENCE

In order to give to the concerned Depts of CDDL a view of the modern materials , equipment and technologies , number of letters have been sent to different manufacturer's requesting production programmes and technical informations to be supply to us . Not all manufacturers answered till now but several documents were submitted and handed over to CDDL . The list of correspondence is given below :

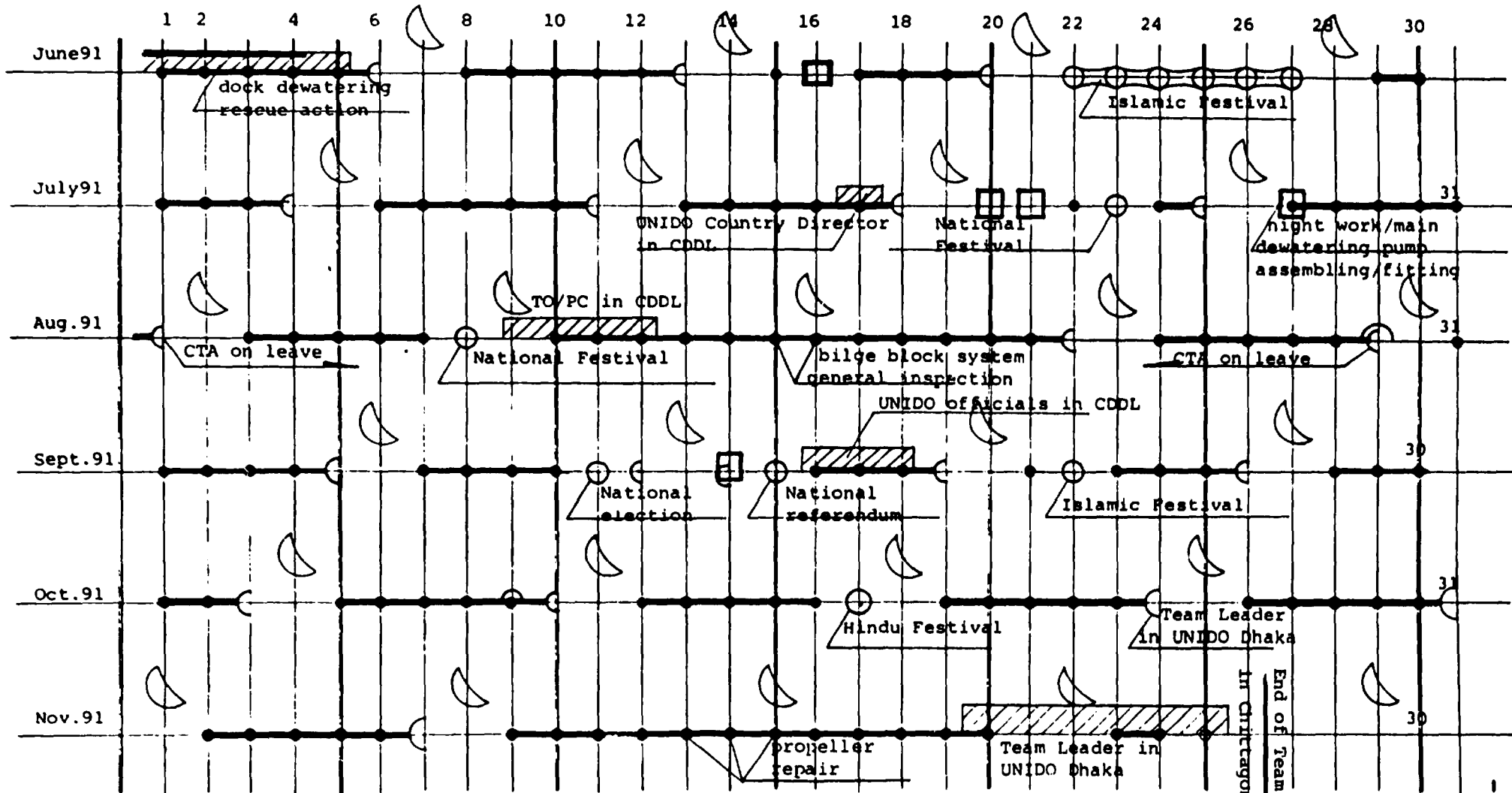
- | | | |
|------------------------|------------|--|
| 1.CMR | France | electrical marine equipment ; |
| 2.Brush | England | electrotechnical materials ; |
| 3.NorControl | Norway | automatic marine systems for electric power and propulsion plant; |
| 4.BOL | Bangladesh | welding materials ; |
| 5.MAN | Germany | lifting appliance - crane ; |
| 6.Kabelmetal | Germany | modern marine electrical cables ; |
| 7.Denyo Co Ltd | Japan | engine driven generator regarding troubles shooting ; |
| 8.Devcon | USA | filling resin materials for mechanical parts repair purpose ; |
| 9.Kansai Paint | Singapore | electro-insulating pain'ts and insulating materials ; |
| 10.Huta Baildon | Poland | welding materials ; |
| 11.Madpol | Poland | "Jellow pages" of Poland ; |
| 12.Zaklad przekaznikow | Poland | electromagnetic auxiliary relays ; |
| 13.Ema Brzezic | Poland | welding materials ; |
| 14.Autronica | Norway | electronic marine measurement and and monitoring systems for engine room ; |
| 15.Teddington | England | protection devices and control systems for marine application ; |
| 16.Akashi Tetsu | Japan | balancing machines for balancing of rotating parts of machinaries ; vibromeasuring equipment ; |
| 17.Bimet | Poland | self-lubricating bearings ; |

- 18. Avesta Welding Sveden welding materials ;
- 19. Ema Elester Poland contactors and control circuits components ;
- 20. FLT Krasnik Poland rolling bearings ;
- 21. Lumel Poland electromagnetic auxiliary relays R15 family ;
- 22. Refa Poland auxiliary and time relays ;
overload current protections ;



- shipyard internal festival/works not interrupted
- shipyard closed due to other than Hartal occasions
- Hartal in Chittagong/works interrupted or performed partially
- X meeting with General Management or technical meeting

- working time of the Team
- ◐ half day
- ☾ Friday/weekend
- △ Union election in CDDL



normal operation time Saturday to Wednesday 8.30 to 16.30 ; Thursday 8.30 to 12.30 ;
overtimes in respective expert area not included

In Chittagong Dry Dock

month	working days **		official holidays	remarks
	full day w/s*	half day		
Dec. 90	13/15	3	2	plus-2 days whole Team available in BSEC and UNIDO Dhaka -5 days whole Team available in UNIDO HQ Vienna
Jan. 91	20/20	3	-	5 day lost - Gulf War-confirmed between CTA and UNIDO Dhaka
Feb. 91	18/20	3	1	0.5 day lost - demonstrations in Chittagong 3 days lost - Parliamentary Election
March 91	20/20	2	2	1 day lost: Eastern confirmed with CDDL 1 day lost: Union election in CDDL
April 91	17/22	2	6	0.5 day lost 29.04 due to cyclone
May 91	25/21	3	-	
June 91	16/20	3	6	1 day lost due to Hartal in Chittagong
July 91	20/23	4	1	2 days lost due to Hartal in Chittagong
Aug. 91	23/20	3	1	
Sep. 91	18/22	4	3	0.5 day lost due to Hartal in Chittagong
Oct. 91	22/22	4	1	
Nov. 91	20/22	2	-	
Dec. 91	- / 8	-	-	
.1	232/255	36	23	days lost :

- Hartal : 3.5 days : 3.5 days
- Gulf War : 5 days
- elections : 4 days
- demonstrations : 0.5 days
- day before cyclone: 0.5 days
- Eastern Holiday : 1 day
- local Holidays : 23 days
- total days lost : 37.5 days

days lost due to earlier departure of Team from Project Area : 11 days/person
 total days Team was supposed to work : 255 - 9 UNIDO holidays: 246 days/person
 total of worked by Team days : 232 + 36/2 = 232 + 18 : 250 days/person
 notes:-overtime of particular Team member are not included

- "*" w - amount of worked days
- s - amount of day supposed to be worked
- "***"day effectively utilised

Suggestions & Recommendations

1. One year (twelve month) of foremen team assignment makes period of Subcontractor activity too short due to the following reasons :-
 - very long period of foreign experts asimilation to extremely different cultural , technological , organisational and climatic conditions of BangladeshThe above mentioned reasons were discussed locally in Project Area at the begining of Team assignment and the same was confirmed by twelve month experience of Contractor . It would be reasonable to make assignment of Subcontractor longer than 12 months in any possible way:-
 - to extend contract for next 12 months (but no less than six month) ;
 - to ensure presence of no less than one or two experts belonging to the previous Team ;in order to maintain continuation of personal relations between experts and local staff .
2. In order to fulfill contractual obligations as properly as possible , mental position of Team members is to be maintained on the highest level :-
 - few weeks leave is to be compensatory or
 - presence of experts family members is mostly advisable.In case of our team , presence of families in Project Area was impossible due to "bad fame" of the Country and also due to lack of accurate (lack of any) informations about local conditions which are extremaly different but acceptable anyway . Access to adequate information is difficult also in West Europe . In such conditions proper briefing performed by experienced UN staff seems to be necessary for long time before departure from Home Office to Project Area .
3. Direct contact/relations between counterparts , both local (CDDL) authorities and Subcontractor's staff (i.e. Training Officer/Project Co-ordinator or Team Leader) is necessary at least one month before Team arrival into Project Area in order to change points of view and to clarify thesis given in Terms of Reference . The said document seems to be too general in respect of Contractor's staff experience in Project Area .
4. It is not possible to expect that Contractor's , low technical level staff may be able to valuate or solve general or strategic problems of large industrial enterprise . Such personnel may only give technical or organizational recommendations coming from proffesional experience and propose particulars as given below :-
 - a) Necessity of professional library arrangement specially of manufacturer's manuals was clearly shown and explained . Collection , storage , preservation and free access (in time) for manuals of any Yard equipment is necessary .
 - b) Establishment of departmental tool stores is reasonable on the basis of previos practise and in order to ensure free and easy access to any tool which may be currently necessary . Since each particular tool

belongs to specific department . utilisation of such tools by other users is difficult due to lack of central tool register . Each tool should be registered and to be handed over back to the store immediately after completion of works . "Tool Department" is to be in charge to store , preservr tools and instruments and to maintain such operational condition of tool to ensure it's immediate utilisation when necessary .

- c) Sophisticated mechanical tools are to be run by single or two workers trained and authorised to operate particular equipment . Operator is to be in charge to perform such daily maintenance as cleaning , operational tests of all basic/main functions and also equipment preservation after daily work completion . Daily maintenance is to be performed even if equipment is not working in this particular day . Each working stage is to be equiped with basic instruments , small tools and materials for maintenance (brush , rugs , grease) and also with containers for litter/waste products .
- d) Maintenance Department should be in charge of maintenance both periodical and general . All repair works are to be performed by production departments .
- e) Particular departments i.e. : Electrical Dept. , Hydraulic Dept. or Hydraulic Section of Shiprepair Dept. Welding Section , Machine Tools Dept. are to be equiped with separate comparements/shops have been arranged in such convenient manner to ensure/provide cleanness of their workshops . Specially in climatic conditions of Bangladesh those is important but difficult to maintain . Several recommendations were given by experts in this matter regarding the followings :-
- safety screens , fitting tables , rolling floors , working position of gas cylinders , safety clothes , terms of gas cylinder storing etc. for welding shop (fabricating shop) ;
 - arrangement of basic equipment and principles of works organisation also wooden floor for hydraulic shop ;
 - basic equipment and arrangements for electrical dept.- proposals of several methods were given .
- Number of suggestions was utilised by CDDL with satisfactory results . Most of others need additional investment and however of highest importance they are not possible to be realised in the near future by Shipyard itself .
- f) Quality Control Dept. and Safety Dept. should be separated one from another . Quality Dept. should work in the following conditions :-
- should be directly under General Manager supervision ;
 - the highest skilled shipyard employees should be in charge of Quality Control Dept. ;
 - professional and organisational structure of Quality Control Dept. should be adequate to the structure of production depts. , which quality surveyors should co-operate with . Quality Control surveyors should be in close contact with their respective production depts. but in such a manner to ensure surveyor's independence .

Organizational schedule of QC Dept. was submitted to CDDL along with file of currently used documents (measuring sheets, certificates etc.). Also examples for specific measurements were prepared, handed over and utilised by CDDL services under experts supervision.

- g) Safety Department should work directly under supervision of General Manager, also should be allowed to issue special instructions or even stop or cancel particular production operations, unless ensuring proper safe working conditions may be maintained. Several situations was utilised by experts to interfere in particular operations in order to ensure safety of people and/or equipment being under repair.
- h) Internal training system exist and operate on the basis of customary form and exist as vocational guidance which is used to be performed before or/and during works performance. Training on job by Subcontractor's experts have been performed on the same background. As the contribution of Subcontractor the organisational scheme and training programme for few shipyard's specialisations was submitted to CDDL. Internal school of the Yard should work on the basis of one hour or two hours lectures and should be performed on ad-hoc basis in workshops and should be run by highly skilled, experienced foremen or CDDL engineers. The necessary time may be used partially from unutilised operational/working time (instead of cup of tea). Institutional form of internal school needs financial investment in order to prepare classrooms and auxiliary equipments also skilled teachers. The form have been proposed and effectively implemented but needs only lecture texts in written form which would be easily distributed among workers. The above said form works effectively as local custom and gives good result.
- i) Arrangement/establishment of separate Technological Office or Section is necessary. The said office should be in charge to prepare works standards and technological instructions preparation. Such documents are to be utilised as operational guidance and on the other hand as lectures materials for internal school. Those should be prepared by specialists and to consists of fully particular operation's description for particular technological process. Each worker should have free and easy access for copy of document but illiteratureness is not to be a good reason for any limitations. Several papers have been prepared by experts and should be considered as an example of such technological instructions. All documents should be prepared on the base of international codes and contain the literature list for further informations.

- j) The following recommendations have been suggested regarding Trade Unions activities .
- Limitation of Trade Union activities (not fully democratic) which power can not be regarded as constructive by :-
 - making union responsible for results of its activities or
 - sharing management activities of Yard with the Union .
- k) Financial motivation of employees in necessary to implement in the Yard in such a manner to make skilled and usefull for enterprise people paid better than the others . Long term employment should not to be matter of consideration in case of worker's wage .
- l) Big difficulties of spare parts purchase may cause very fast equipment decapitalisation . Those difficulties has external backgrounds and are not of shipyard responsibilities .
- m) CDDL is very well equipped with huge number of items and machinery , provide well educated staff of all necessary in shipyard professions . Bad operational result and low operational result/efficiency may be considered as a result of ambient conditions and lack of professional experience . That is why direct contact with ground level technical professionals is highly expected locally and may be advised by all who is able to get in close touch with local workers , foremen or officers .
5. It seems to be necessary to specify and explain the co-operation way between CTA (Chief Technical Adviser or UNIDO local uauthorities) and Subcontractor's Team before start of contractual activities in order to fully utilise international staff and reach profitable outputs for local counterparts . Critical estimations are to be prepared only unless usefull and may be profitable . The truth of Bangladesh is quite different than the same truth elsewhere in the world . In this respect fact that almost all both UNIDO and Subcontractor's staff performed their duties only first time in Project Area of Bangladesh is to be considered as an unfortunity .
6. Shipyard many times have been tried to point out the followings :-
- importance of abroad training for local technical staff . Such voyages are matter of stormy discussions as expensive and not as profitable as one may expect . Part of such travells have been blocked . Considering that about 20% of applicants for foreign training comes from outside of Shipyard does not disturb the idea in general , due to fact that those people are connected with shipyard industry as well ;
 - number of items of equipment was delivered to CDDL by UNIDO during phase I of Project . Those are usefull and utilised by CDDL during its operations . Also possibilities of additional delivery were expected to be utilise during phase II . In this respect the following equipments may be recommended :-

- personal computer of standard calculation power with hard disc drive , floppy disc drive , printer , RAM memory of such value to make possible utilisation of basic CAD software ;
- cathode oscilloscope may make possible performance of Yard's electrical equipment service and also additionally service for customers outside of shipyard ;
- literature for professional schools and workshop manuals for various shipyard professions :
The Contractor left in shipyard miscellaneous literature , used by experts during their stay in CDDL . This is however in Polish language , and can only be used by very few local staff (engineers) educated in Poland and speaking Polish . Therefore an access to informations in said literature is limited . The professional literature in English language is hardly available in Bangladesh ;
- The UNIDO property being used in the UNIDO office , and staff in the Project Area should be also available and helpfull for CDDL not only for international staff .

7. Centralised distributing system of compressed air is to be established/arranged around dock and in workshops in order to use compressed air driven tools instead of the same driven by electricity . Advantages may be taken are as follows :

- elimination of hazardous value of electrical voltage (220V) in order to maintain antielectric shock protection ;
- elimination of tools driven by electricity in explosion hazardous area working areas ;
- increasing of works efficiency ;
- decrease of electrical power consumption .

8. Arrangement of antielectric shock precautions is necessary by means of :

- a) establishing low (safe) voltage (42V/60V) supply for lighting purpose in working areas or ;
- b) utilise of separating transformers for this purpose or ;
- c) utilise of leakage current relays .

Methods "a" and "b" are utilised in Polish shipyards with big efficiency but method "c" is mostly recommended as the safest .

9. Technology of repair/maintenance of electric equipment was suggested to be changed and have been utilised with good result . Utilising proper chemicals suggested by expert is mostly recommended .
10. In spite of the end of Project Phase II it seems to be necessary to provide by UNIDO necessary financial possibilities in order to supply CDDL with necessary equipment and professional books for library .
11. Establishment/practical implementation of real internal school of ground technical level on basis of Training Programme documents contributed by Subcontractor .
12. Implementation of properly organised Quality Control Department is possible on basis of documents supplied by Subcontractor . It can be arranged utilising existing staff of Quality Control Dept.
13. Shipyard have to try to implement cost/man hour counting system such as have been forwarded to her . Sample explains in particulars the way how to increase work efficiency and also financial effect .
14. Huge job of updating prepared by Team maintenance documents, and implementation of maintenance methods have been suggested may increase safe and failureless operation of yard machinery .
15. During contractual shiprepair works utilising of "Shipyard Standard" is recommended in order to increase quality of works and to make relations with customer more easy .