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UNITED NATIONS INDUSTRIAL DEVELOPMENT ORGANIZATION

VIENNA, AUSTRIA

AND

ARAB INDUSTRIAL DEVELOPMENT AND MINING ORGANIZATION

RABAT, MOROCCO

PROJECT PROFILE

ON

HIGH VOLTAGE AND ULTRA HIGH VOLTAGE TOWERS

FINAL REPORT

DEVELOPMENT CONSULTANTS INTERNATIONAL LIMITED

MANAGEMENT CONSULTANCY DIVISION

24-B PARK STREET, CALCUTTA 700 016, INDIA

PROJECT PROFILE
ON
HIGH VOLTAGE
AND
ULTRA HIGH VOLTAGE TOWERS

FEBRUARY 1996

DEVELOPMENT CONSULTANTS INTERNATIONAL LIMITED
MANAGEMENT CONSULTANCY DIVISION

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DCIL-105/AC-5/1098

February 22, 1996

United Nations Industrial
Development Organisation
Vienna International Centre
P.O. Box 300
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Attn : Mr V. Koloskov

Project Profile on High Voltage
and Ultra High Voltage Towers

Dear Sirs :

We take pleasure in submitting to you twenty (20) copies of our Final Report on the above subject.

We trust that you will find the present report useful and responsive to your requirement.

We look forward to further association with your organisation in future.

Thanking you,

Very truly yours :
DEVELOPMENT CONSULTANTS
INTERNATIONAL LIMITED

Siddhartha Ganguly
Project Coordinator

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LIST OF ABBREVIATIONS

AC/DC	:	Alternating Current/Direct Current
ASTM	:	American Society for Testing & Materials
CIF	:	Cost Insurance and Freight
DPR	:	Detailed Project Report
EOT	:	Electric Overhead Travelling
FOB	:	Free on Board
HV	:	High Voltage
IRR	:	Internal Rate of Return
Kg/Cm^2	:	Kilogram Per Square Centimetre
Kgf/Cm^2	:	Kilogram force per square centimetre
KV	:	Kilo-Volt
KW	:	Kilowatt
LXW	:	Length x Width
m	:	Metre
MCC	:	Machine Control Centre
mm	:	Milimetre
MT	:	Metric Tonne
MW	:	Megawatt
p.a.	:	Per Annum
R.C.C	:	Reinforced Concrete Construction
rpm	:	Revolutions Per Minute
TPA	:	Tonnes Per Annum
U.A.E	:	Unitd Arab Emirates
UHV	:	Ultra High Voltage
°C	:	Centigrade

SECTION - 1
INTRODUCTION

INTRODUCTION

The Sixth Arab Industrial Development Conference held in Damascus in October 1984, stressed on the importance of setting up facilities in the Arab region for manufacture of products used in electricity generation, transmission and distribution. Subsequently, the Arab Industrial Development & Mining Organization (AIDMO), prepared a Sectoral Report on the status of electricity generation, growth prospects in the region and requirement of equipment/facilities thereof. The study covered 21 Arab countries for the period 1986-2010 AD.

Based on the findings of the Sectoral study, AIDMO in consultation with UNIDO, shortlisted 8 products for which it wanted to get project profiles prepared. One of the designated products is **High Voltage (HV) and Ultra High Voltage (UHV) Transmission Line Towers**. The objective of the project profile is to provide sufficient information so that prospective promoters and sponsors find themselves in a position to evaluate the project.

The Scope of Work for this Project Profile includes the following :

- Description, special characteristics, features and uses of the product
- Identification of major end-user industries
- Assessment of present production capacity
- Assessment of supply and demand for the product in the designated region

- Identification of demand-supply gap and evaluation of the possibility of entering the market
- Description of basic manufacturing process
- Process flow chart
- Brief specifications of plant and machinery and their indicative prices
- Estimated requirements of raw materials, their sources and prices
- Estimated requirements of utilities such as power, water, compressed air, fuel oil, etc.
- Estimated requirement of manpower
- Estimated requirement of space and plant layout
- Plant location
- Project cost estimate
- Project financial analysis and evaluation
- Project implementation schedule

This study is confined to the following 13 countries -

Algeria	Bahrain
Egypt	Iraq
Jordan	Kuwait
Libya	Morocco
Saudi Arabia	Sudan
Syria	Tunisia
U.A.E.	

A separate market survey, according to AIDMO, was not required to be carried out prior to preparing this project profile, since the information and projections contained in the Sectoral study conducted by them was indicated to be adequate for the purpose. Therefore, the Section on 'Market Analysis' is based entirely on the Sectoral study carried out by AIDMO.

The contents of this Report have been organised in a manner as to present the reader with a logical sequence of analysis and findings.

Salient features of the project have been summarised in the following Section. The Section presented thereafter describes the product, with a view to familiarise the reader with its features, characteristics and uses. The Section on 'Market Analysis' provides demand projections. Plant capacities and recommended locations for establishing the proposed manufacturing facilities are discussed in the next Section.

Manufacturing process is dealt with in a separate Section, titled 'Manufacturing Process'. This is followed by a Section on 'Plant and Equipment'. Estimates of raw materials and other inputs, requirement of utilities and estimates of space and layout are presented in separate Sections. This is followed by a Section on estimated requirement of manpower and the recommended organisation structure.

SECTION - 2
SUMMARY OF FINDINGS

SUMMARY OF FINDINGS

From our findings, we observe that 4 manufacturing plants may be set up in order to cater to the demand for UHV and HV transmission line towers in the designated region. We recommend that these plants be set up in

- Algeria
- Egypt
- Iraq
- Saudi Arabia

Of these, the first three shall have capacities of 36,000 tonnes per annum (TPA) each. In fact, the plants at each location will consist of two adjacent sheds each, with facilities for fabrication of 18,000 TPA of steel along with some common facilities. The plant in Saudi Arabia may be set up with a capacity of 18,000 TPA. The 36,000 and 18,000 tonne plants shall have the capacity to produce about 4,900 and 2,500 towers per annum respectively in the 66-400 KV range.

Our findings reveal that with the increase in power consumption, more overhead transmission lines would be laid, justifying the establishment of these plants.

Summary of basic parameters and significant features of the project is presented in Exhibit-1.

JOB NO. : DCIL-105 EXHIBIT : 1

UNITED NATIONS INDUSTRIAL DEVELOPMENT ORGANIZATION
AND
ARAB INDUSTRIAL DEVELOPMENT AND MINING ORGANIZATION

PROJECT PROFILE ON HIGH VOLTAGE AND ULTRA HIGH VOLTAGE TOWERS

SUMMARY OF FINDINGS

Sl. No.	Particulars	Plant 1	2	3	4
1.	Location	Algeria	Egypt	Iraq	S. Arabia
2.	Plant Capacity (TPA)	36,000	36,000	36,000	18,000
3.	Area Requirement (sq mts)	28,500	28,500	28,500	17,000
4.	Manpower Requirement (Nos)	706	706	706	442
5.	Implementation Period (Months)	30	30	30	30
6.	Project Cost ($ million)	23.87	17.76	20.87	10.05
7.	Break-Even Point (%)	73.25	28.43	53.88	60.86
8.	IRR (%)	34.85	91.30	58.47	52.62

SECTION - 3
PRODUCT ANALYSIS

PRODUCT ANALYSIS

Transmission towers are an integral part of the overhead electric power transmission system. This high order indeterminate structure supports other major components of the transmission system such as line conductors, ground wires, insulators, surge arrestors, relaying and protective gears, and other hardware. Transmission towers, used for transmission of power at 66 KV and above, are generally made of steel. These towers represent nearly 35 - 45% of the total cost of the transmission line system.

TYPES OF HV/UHV TRANSMISSION LINE TOWERS

Transmission towers are either of the self-supporting or guyed type. Self-supporting towers have stiff load bearing members whereas in guyed towers, flexible guys too take a part of the load. Self-supporting towers are generally used in congested areas where right-of-the-way is limited, necessitating the use of short spans. Right-of-the-way for guyed towers needs to be chosen carefully as guys are susceptible to damage on being struck by heavy farm equipment or heavy vehicles.

Transmission towers are classified on the basis of number of circuits, configuration of conductors or angle of deviation of the transmission line. These classifications are discussed below.

Classification based on number of circuits

The single circuit tower supports three numbers of phase conductors; one for each phase, and one or two earthed

wires. The double circuit tower carries two sets of three phase conductors with one/two or more earthed wires.

Classification based on conductor configuration

In a horizontally configured tower, the phase conductors are arranged in the horizontal/near horizontal plane. Vertical configuration tower has the phase conductors arranged in the vertical/near vertical plane. When the phase conductors are arranged at the corners of a triangle, the tower is said to have a triangular configuration.

Classification based on angle of deviation of transmission line

These are of 3 types - suspension tower, angle tower and dead-end tower. While the angle of deviation in the case of suspension towers varies from 0° - 2°, it is more than 2° for angle towers. Large angle towers may have an angle of deviation which is as high as 60°. Dead-end towers are terminal towers, usually put up at sub-stations.

Sketches of different types of towers are shown in Exhibit-2.

CONSTRUCTION OF TOWERS

The stability of a transmission tower depends on its weight, which in turn is influenced by the tower configuration and its bracing pattern. The parameters that are considered while designing a tower include the following :

- o height of the tower from ground level
- o length of cross-arms and conductor spacing
- o tower width at the base and top hamper
- o bracing pattern

Design parameters and standards are specified by various national and international standards organisations. These may vary from country to country, depending on the local regulations and statutory requirements.

The height of a tower in level country comprises the permissible ground clearance of the conductors, maximum sag of the lowermost conductor, vertical spacing between conductors including maximum string length of insulators, and height of the ground wire's peak portion from the top most conductor. Heights of transmission towers vary from about 16 meters in the case of 66 KV towers to 34 meters in the case of 400 KV towers.

The length of the cross-arm and the horizontal and vertical spacing between conductors are determined on the basis of the following factors :

- length and composition of insulator string.
- allowable swings of insulator string
- clearance of conductors from the nearest metallic structure
- the tower width at the cross-arm level
- the shield angle of the tower

In most tower configurations, the length of the cross-arms is equal to the horizontal spacing between the outer most conductors. For a 66 KV tower, the length of the cross-arm is only about 4 meters, whereas it is as much as 16 meters for a 400 KV tower. The vertical spacing between conductors varies from 1 meter (66 KV) to 8 meters (400 KV).

Tower width at base is the distance between the centre of gravity of one corner leg and that of the adjacent corner leg. The width depends on the magnitude of physical loads imposed on the tower, type of conductors used, magnitude of wind loads and the height above the ground level at which external loads are applied. The total height of a 66 KV tower is nearly 9.5 times its base width, while the height of a 400 KV tower is only about 4.4 times the base width.

Top hamper width is the width of the tower at the level of the lower cross-arm or at the middle cross-arm level (double circuit towers), or at the waist line for towers having horizontal conductor configuration. The top hamper width is generally found to be about one-third of the base width for tangent and light angle towers, and about two-sevenths of the base width for medium and heavy angle towers. For horizontal configurations, the width at the waist line varies from two-fifths to two-thirds of the base width.

Bracing pattern

Several types of bracing patterns are used in the design and construction of transmission towers. The most common patterns are :

- Single web system
- Double web system
- Pratt system

Single web system : This system comprises either diagonals and struts or only diagonals. In case of the former, struts are designed for compression while diagonals are for tension. In the all-diagonal system, diagonal members are designed to withstand both tension as well as compression.

This system is generally used for 66 KV narrow-base, single circuit towers and does not find much use in wide-base UHV/HV towers.

Double web system : This system with diagonal cross bracings is used for both small and large towers. Diagonal members are designed in such a fashion that while one is in compression, the other is in tension. These bracings result in better distribution of loads across legs and footings.

Pratt system : In this system, shear is carried entirely by one of the diagonal members under tension, while the other member is not subjected to stress. The advantage of this system is that the sizes of diagonal members are small. This is because they are designed for high slenderness ratio so as to make them act in tension.

The other types of bracings used are the Portal system and the Diamond bracing system. Exhibit-3 shows different types of bracing systems.

Loads on tower

Transmission line towers have to withstand the following types of loads :

- o transverse loads
- o longitudinal loads
- o torsional loads
- o vertical and eccentric vertical loads

Transverse loads

Transverse loads are due to -

- o wind on structure, conductor, insulator and hardware
- o deviation in the line

These loads act along the longitudinal axis of the cross arms. It is assumed that two faces parallel to the longitudinal axis of the cross arms equally share the transverse load.

Longitudinal loads

Longitudinal loads are due to unbalanced tension in the conductor, produced either due to dead-ending of conductor on the structure or due to broken wire condition. It acts horizontally along the direction of the line.

Torsional loads

Torsional loads are produced when there is unbalanced tension in the conductor on the two sides. This tension may occur due to a broken wire condition or due to dead-ending of the conductor on single circuit lines. This causes twisting moments about the central axis of the tower. Torsional load is equally shared by all the four faces of a tower.

Vertical and Eccentric Vertical loads

These loads occur due to -

- weight of conductor, ground wire, insulator strings and accessories
- unequal loading in the case of triangular arrangement of conductors in single circuit towers
- unbalanced vertical loads under broken wire conditions
- dead weight of the structure and the provision for the weight of maintenance crew

Vertical loads are applied at the point of conductor supports.

Earthquake forces and temperature stresses are usually not considered for structures of normal height.

MATERIAL OF CONSTRUCTION

Structural steel and low alloy steels are the most commonly used materials for manufacture of transmission line towers. The towers made from steel require less inspection, last longer and require less expensive maintenance. However, at present, use of high strength aluminium alloy towers is on the increase.

Steel towers are hot dip galvanised to make them free from surface corrosion, and to help them last longer. Bolts, nuts and other hardware are also galvanised. Towers located near industrial plants and in acidic atmospheres should not be galvanised. In some cases, towers are painted first with a mixture of red lead and raw linseed oil and then with enamel. It is necessary to repaint the structures every 2-3 years to keep them in good condition.

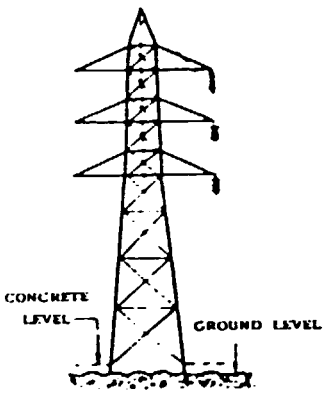
Towers are finally assembled at the site. The weight of a transmission tower varies from 0.3 tonnes for LV towers to 10 tonnes for UHV towers.

JOB NO. : DCIL-105 EXHIBIT : 2

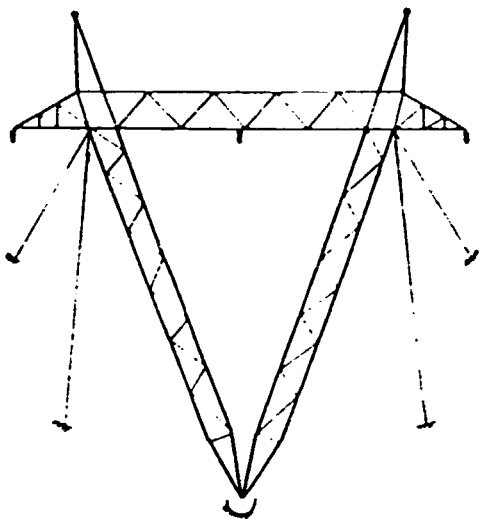
UNITED NATIONS INDUSTRIAL DEVELOPMENT ORGANIZATION
AND
ARAB INDUSTRIAL DEVELOPMENT AND MINING ORGANIZATION

PROJECT PROFILE ON HIGH VOLTAGE AND ULTRA HIGH VOLTAGE TOWERS

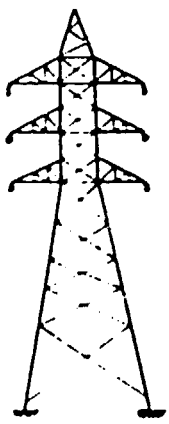
TYPES OF TRANSMISSION TOWERS



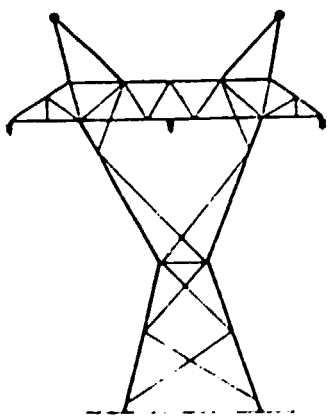
SELF-SUPPORTING
SINGLE CIRCUIT TOWER



SINGLE CIRCUIT
GUYED TOWER



DOUBLE CIRCUIT
VERTICAL CONFIGURATION TOWER



SINGLE CIRCUIT
HORIZONTAL CONFIGURATION TOWER

JOB NO. : DCIL-105 EXHIBIT : 3

UNITED NATIONS INDUSTRIAL DEVELOPMENT ORGANIZATION
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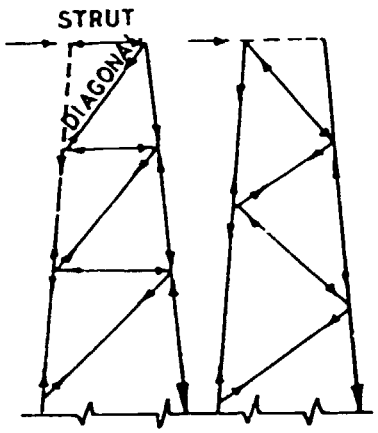
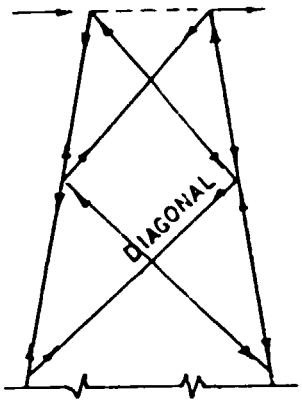
ARAB INDUSTRIAL DEVELOPMENT AND MINING ORGANIZATION

PROJECT PROFILE ON HIGH VOLTAGE AND ULTRA HIGH VOLTAGE TOWERS

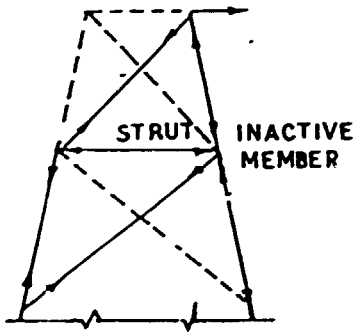
TYPES OF BRACING SYSTEMS



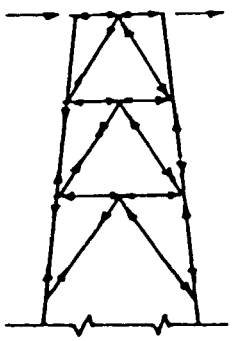
SINGLE WEB SYSTEM



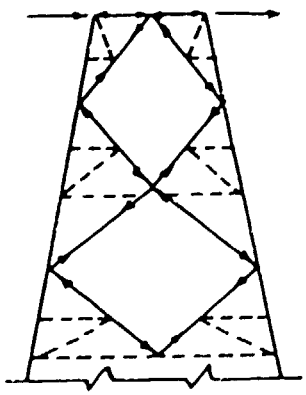
DOUBLE WEB SYSTEM



PRATT SYSTEM



PORTAL SYSTEM



DIAMOND BRACING SYSTEM

SECTION - 4
MARKET ANALYSIS

MARKET ANALYSIS

Transmission line towers link the points of power generation and consumption via the transmission and distribution network. Therefore, an increase in power generation or power consumption is generally accompanied by an increase in the length of transmission and/or distribution network.

According to the Sectoral study carried out by AIDMO, the average annual increase in power generating capacity for the 13 countries covered ranges from 6,700 MW in the early 90s to nearly 9,300 MW by 2010 AD. Correspondingly, demand for various electrical equipment including transmission towers, is estimated to increase substantially to service the additional capacity of power generation.

Projected additions to overhead transmission network, as extracted from the AIDMO report on Sectoral study, for the period 1991-2010 are given in Exhibit-4. Transmission voltages have been grouped in this exhibit in the following manner :

Ultra High Voltage (UHV)	-	> 300 KV
High Voltage (HV)	-	60 KV to 225 KV

This Exhibit gives country-wise additions to UHV and HV transmission network for four 5-year periods. Exhibit-5 presents the average annual requirement of towers in tonnes for each of the countries being studied. This has been worked out on the basis of the following norms, used in the AIDMO report.

	No. of Towers/Km	Weight (Tonnes) Tower
UHV towers -	2.5	10.00
HV tower -	3.0	7.33

The projected requirements of towers are based on the additional generating capacities projected by AIDMO. However, what was actually implemented during the period 1986-90 by many countries was only about 50 - 80% of the projections made by AIDMO. Hence, as a conservative estimate, it is assumed that only 70% of the additional generating capacity proposed in the AIDMO report may actually be implemented. Accordingly, the annual demand for towers is taken as only 70% of the projections made by AIDMO. Exhibit-6 gives the annual demand for UHV/HV towers. It may be seen from this Exhibit that the annual demand for these towers range from about 155,000 tonnes during the period 1991-95 to nearly 190,000 tonnes for the period 2006-10.

At present, nearly the entire demand in the region is met through imports. It is recommended that 4 manufacturing plants are set up to manufacture UHV and HV towers in the Arab region.

Keeping in mind the standard plant sizes, the capacities recommended for different countries may eventually be able to meet about 70% to 100% of estimated demand. Identical plant sizes will not only facilitate easier implementation, but also help in attending to operational problems with greater ease. Three of the recommended plants will have a capacity to manufacture 36,000 tonnes of towers per year while the fourth one will manufacture 18,000 tonnes per year.

JOB NO. : DCIL-105 EXHIBIT : 4

UNITED NATIONS INDUSTRIAL DEVELOPMENT ORGANIZATION
AND
ARAB INDUSTRIAL DEVELOPMENT AND MINING ORGANIZATION

PROJECT PROFILE ON HIGH VOLTAGE AND ULTRA HIGH VOLTAGE TOWERS

PROJECTED ADDITIONAL OVERHEAD TRANSMISSION NETWORK

(Figures in KM)

Country	1991-1995		1996-2000		2001-2005		2006-2010	
	UHV	HV	UHV	HV	UHV	HV	UHV	HV
Algeria	-	4218	-	4287	-	4287	-	4287
Bahrain	-	100	-	160	-	160	-	160
Egypt	-	6778	-	8531	-	8531	-	8531
Iraq	3489	9866	4116	11639	4116	11639	4116	11639
Jordan	-	1457	-	1553	-	1553	-	1553
Kuwait	189	504	189	504	189	504	189	504
Libya	-	5112	-	5112	-	5112	-	5112
Morocco	-	2768	-	3816	-	3816	-	3816
S. Arabia	1175	2743	1430	3337	1430	3337	1430	3337
Sudan	-	306	-	470	-	470	-	470
Syria	742	6673	1077	9693	1077	9693	1077	9693
Tunisia	-	859	-	822	-	916	-	916
U.A.E.	-	2630	1938	1938	1938	1938	1938	1938
TOTAL	5595	44014	8750	51862	8750	51956	8750	51956

JOB NO. : DCIL-105 EXHIBIT : 5

UNITED NATIONS INDUSTRIAL DEVELOPMENT ORGANIZATION AND ARAB INDUSTRIAL DEVELOPMENT AND MINING ORGANIZATION

PROJECT PROFILE ON HIGH VOLTAGE AND ULTRA HIGH VOLTAGE TOWERS

PROJECTED AVERAGE ANNUAL REQUIREMENT OF TRANSMISSION TOWERS

(Figures in Tonnes)

Country	1991-1995		1996-2000		2001-2005		2006-2010	
	UHV	HV	UHV	HV	UHV	HV	UHV	HV
Algeria	-	18559	-	18863	-	18863	-	18863
Bahrain	-	440	-	704	-	704	-	704
Egypt	-	29823	-	37536	-	37536	-	37536
Iraq	17445	43410	20580	51212	20580	51212	20580	51212
Jordan	-	6411	-	6833	-	6833	-	6833
Kuwait	945	2218	945	2218	945	2218	945	2218
Libya	-	22493	-	22493	-	22493	-	22493
Morocco	-	12179	-	16790	-	16790	-	16790
S. Arabia	5875	12069	7150	14683	7150	14683	7150	14683
Sudan	-	1346	-	2068	-	2068	-	2068
Syria	3710	29361	5385	42649	5385	42649	5385	42649
Tunisia	-	3780	-	3617	-	4030	-	4030
U.A.E.	-	11572	9690	8527	9690	8527	9690	8527
Total	27975	193662	43750	228193	43750	228606	43750	228606

JOB NO. : DCIL-105 EXHIBIT : 6

UNITED NATIONS INDUSTRIAL DEVELOPMENT ORGANIZATION AND ARAB INDUSTRIAL DEVELOPMENT AND MINING ORGANIZATION

PROJECT PROFILE ON HIGH VOLTAGE AND ULTRA HIGH VOLTAGE TOWERS

ESTIMATED ANNUAL DEMAND FOR TRANSMISSION TOWERS

(Figures in Tonnes)

Country	1991-1995		1996-2000		2001-2005		2006-2010	
	UHV	HV	UHV	HV	UHV	HV	UHV	HV
Algeria	-	12991	-	13204	-	13204	-	13204
Bahrain	-	308	-	493	-	493	-	493
Egypt	-	20876	-	26275	-	26275	-	26275
Iraq	12212	30387	14406	35848	14406	35848	14406	35848
Jordan	-	4488	-	4783	-	4783	-	4783
Kuwait	662	1553	662	1553	662	1553	662	1553
Libya	-	15745	-	15745	-	15745	-	15745
Morocco	-	8525	-	11753	-	11753	-	11753
S. Arabia	4113	8448	5005	10278	5005	10278	5005	10278
Sudan	-	942	-	1448	-	1448	-	1448
Syria	2597	20553	3770	29854	3770	29854	3770	29854
Tunisia	-	2646	-	2532	-	2821	-	2821
U.A.E.	-	8100	6783	5969	6783	5969	6783	5969
Total	19584	135562	30626	159735	30626	160024	30626	160024

SECTION - 5
PLANT LOCATION

PLANT LOCATION

The four tower manufacturing plants recommended for different countries within the designated region, will cater to the domestic demand in countries where the plants are set up, and also satisfy the requirements of neighbouring countries. The considerations used for determining the location of tower manufacturing plants are discussed below :

- As most of the steel sections which form the major material inputs are fabricated, there is practically no loss of material during production. Therefore, the costs of transporting raw materials and finished products are not unduly affected so long as the plant is located somewhere between the raw material source and the market.

- As the towers manufactured would cater to the domestic as well as the neighbouring overseas markets of the host countries, it is necessary that transportation linkages are available. For example, roads which directly connect the manufacturing plants with the consumption centres would facilitate transportation. If these two places are separated by sea and the finished products are to be shipped, the plant will need to be located near the port.

- A skilled workforce is not an essential prerequisite for tower manufacture. As most of the operations are fabrication-oriented, these can be taken care of, by semi-skilled or even unskilled workers.

- The land on which the tower manufacturing plant is being set up should preferably be flat. This is to facilitate the setting up of tower testing stations adjoining the manufacturing shop.

- Infrastructural facilities such as power, water, etc., should be easily available. Though quantity of water is not an important consideration, it should be available as and when required.

Taking these factors into account, it is recommended that the four plants are set up in Algeria, Egypt, Iraq and Saudi Arabia. Of these, the first three shall have capacities of 36,000 TPA each, while the other will have a capacity of 18,000 TPA.

Exhibit-7 gives country-wise annual demand for HV/UHV towers in gross and percentage terms, between 1991 and 2010 AD.

A plant may be set up in Algeria near the northern border adjoining the Mediterranean Sea. It will be in a position to meet the requirements of Morocco, Algeria, Tunisia, Egypt and Libya. Also, the site in Algeria will be convenient for sourcing its supply of steel sections and zinc from Tunisia. Transportation of towers to consumption centres at Morocco, Tunisia, Libya and Egypt will also be convenient through roads.

A similar capacity plant may be set up in Egypt. It will cater to the requirements of Egypt, Jordan, Sudan and Syria, which together accounts for about 35% of the total demand. Although it is found that demand will increase in Syria over the years, the plant is recommended in Egypt because of its superior infrastructure. This includes its well developed iron and steel industry which can meet the raw material

requirements. It is preferable to set up the plant near the north-eastern border. From here, it will be convenient to ship the finished products through the Mediterranean Sea and the Red Sea to Syria and Jordan respectively.

Another plant may be set up in Iraq. The domestic demand is large enough to justify this decision. The plant may be located near the port of Basra to facilitate import of raw materials.

The 18,000 TPA plant set up in Saudi Arabia will cater to its domestic requirement besides that of Bahrain, Kuwait and the UAE. The plant should preferably be located on the eastern gulf region. This will help in easy transportation of the towers to Bahrain. Supplies to Kuwait and the UAE can be via land routes.

Tentative locations of the plants are shown in Exhibit-8.

JOB NO. : DCIL-105 EXHIBIT : 7

UNITED NATIONS INDUSTRIAL DEVELOPMENT ORGANIZATION AND ARAB INDUSTRIAL DEVELOPMENT AND MINING ORGANIZATION

PROJECT PROFILE ON HIGH VOLTAGE AND ULTRA HIGH VOLTAGE TOWERS

COUNTRY-WISE ANNUAL DEMAND FOR HV AND UHV TOWERS

(Figures in Tonnes)

Country	1991-95	%	1996-2000	%	2001-2005	%	2006-2010	%
Algeria	12991	8	13204	7	13204	7	13204	7
Libya	15745	10	15745	8	15745	8	15745	8
Morocco	8525	5	11753	6	11753	6	11753	6
Tunisia	2646	2	2532	1	2821	1	2821	1
Sub-total	39907	26	43234	22	43523	22	43523	22
Egypt	20876	13	26275	14	26275	14	26275	14
Syria	23150	15	33624	18	33624	18	33624	18
Jordan	4488	3	4783	3	4783	3	4783	3
Sudan	942	1	1448	1	1448	1	1448	1
Sub-total	49456	32	66130	36	66130	36	66130	36
Iraq	42599	27	50254	26	50254	26	50254	26
Bahrain	308	0	493	0	493	0	493	0
Kuwait	2215	1	2215	1	2215	1	2215	1
S. Arabia	12561	8	15283	8	15283	8	15283	8
U.A.E.	8100	5	12752	7	12752	7	12752	7
Sub-total	23184	14	30743	16	37043	16	37043	16
Total	155146		190361		190650		190650	

JOB NO. : DCIL-105

EXHIBIT : 8

UNITED NATIONS INDUSTRIAL DEVELOPMENT ORGANIZATION
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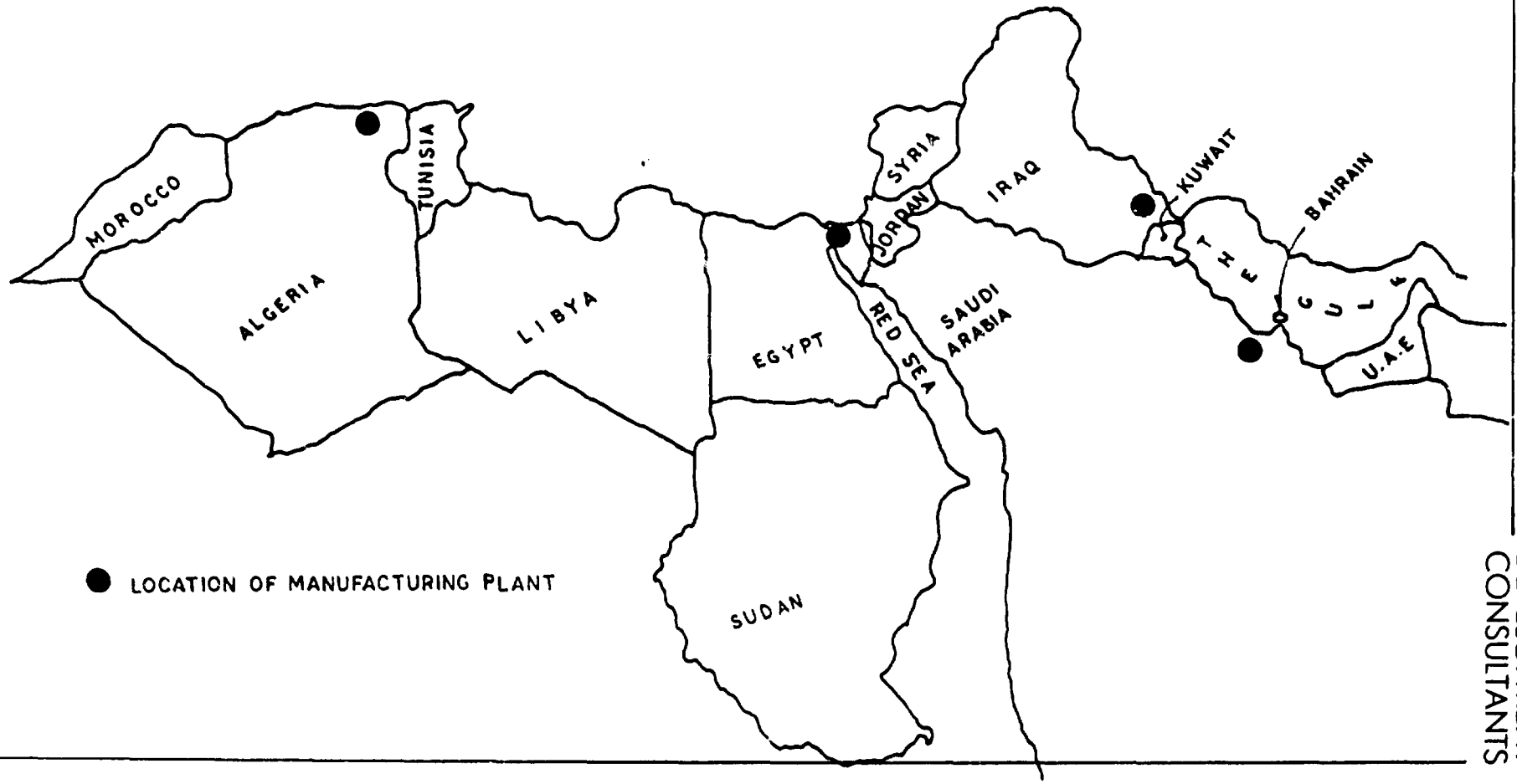
PROJECT PROFILE ON HIGH VOLTAGE AND ULTRA HIGH VOLTAGE TOWERS

TENTATIVE LOCATIONS OF TOWER MANUFACTURING PLANTS



DEVELOPMENT CONSULTANTS

SECTION - 6
MANUFACTURING PROCESS

MANUFACTURING PROCESS

The transmission tower is a bolted structure comprising chord angles, bracing angles, and gusset and joint cover plates. A bolted structure is generally used for the following reasons :

- Transmission towers are erected in remote locations and sometimes in terrains, where it may not be possible to transport the completely welded or riveted structure in one piece. Moreover, erection of the completely assembled structure will require mobile cranes and other material handling facilities, which may not always be available at site. In case of bolted structures, members can be transported in small bundles and erected manually, as these are light in weight and small in size.

- All members of steel towers must be hot-dip galvanised. It is easier and economical to galvanise the individual members, than to galvanise the assembled structure.

FABRICATION

Detailed layout drawings and shop drawings of the tower structure are prepared to provide information such as overall size of the assembly, sizes of individual members, relative position of joints and hole sizes. These drawings also indicate the following details :

- corner cuts, notches, bevel cuts or flange cut/ flange reduction required to provide clearance against fouling
- closing or opening of angle sections, required of members fit over tapering faces
- centre lines
- bend lines

From these drawings marking templates are prepared, showing the position of holes, notches, corner cuts, bends, etc. Individual members of the tower structure are marked using these templates.

Major raw materials used for tower manufacture are steel angles and plates. These are cut to desired sizes and shapes. If necessary, the corners are finished by grinding or deburring. Holes are drilled/punched on the angles and plates. After punching identification marks, these structural members are hot dip galvanised.

Structural components of the tower undergo various cold working operations such as cropping, punching or shearing. Sometimes, flame cutting is also carried out. During these processes, the edges get marginally bent and stresses develop around the edges. The normal practice is to leave about 1 mm more than the desired size and then remove this stress affected area by grinding or machining. To the extent possible, all angle members should be cut to size on a cold circular saw machine. This results in a square edge which is free from internal stress. Similarly, drilling of holes is preferred to punching.

HOT DIP GALVANISING

This is an important process in the manufacture of transmission towers. In order to prevent corrosion of transmission towers, the tower components are hot dip galvanised while still at the manufacturing stage. As it is uneconomical to galvanise the assembled tower, its components are galvanised separately, assembled and then bolted at site. Usually, galvanising is done at the rate of 0.61 kg of zinc coating per square metre of surface area, in accordance with ASTM standard specifications, A-123.

Hot dip galvanising involves the following processes :

- o acid pickling
- o water rinsing
- o fluxing and dipping
- o drying

Acid Pickling

An aqueous solution of sulphuric acid is commonly used to remove mill scale and rust from the steel parts prior to galvanising. The concentration of sulphuric acid in pickling baths normally ranges from 47 grams to 100 grams per litre of water. To increase their effectiveness, usually hot (60°-80° C) sulphuric acid solutions are used.

In order to retard or stop the chemical action of the acid on the base metal, a number of inhibitors are used. The most effective inhibitor is iron sulphate, which is produced by the action of sulphuric acid on the base metal. But, as the concentration of iron sulphate in the acid solution increases, it inhibits the chemical action of the acid. In

practice, the concentration of iron sulphate is kept at 0.2% of the weight of sulphuric acid.

Water Rinsing

Pickled tower components are rinsed thoroughly in hot water mixed with 10% sodium hydroxide solution at 93°C, to neutralise any residual acid. The components are then rinsed in one or more hot water baths to remove any trace of sodium hydroxide solution.

Fluxing and Dipping

Although acid pickling and water rinsing operations remove rust and scale from the components, small amounts of impurities in the form of oxides, sulphates and sulphides remain. These impurities, if present, interfere with the iron-zinc reaction when the steel parts are immersed in molten zinc. A flux is used to remove these impurities and to keep that portion of the surface of the zinc bath at which the components are immersed free from oxides. Zinc ammonium chloride is the common flux used to provide a flux blanket on the molten zinc bath. This floats on the surface of the bath and wets the surface of the components dipped into the zinc bath.

The quality of zinc coating on the components depends on the following factors :

- purity of zinc
- bath temperature
- bath alloying elements
- immersion time
- withdrawal rate
- cooling of coated wires

Purity of Zinc : Pure zinc facilitates the formation of thick and uniform coatings and gives them good bending property. Impurities in zinc cause the layer of zinc coating to scale off.

Bath Temperature : Zinc baths are usually maintained at temperatures ranging from 443°C to 465°C. If the bath temperature is raised beyond this range, formation of oxides at the bath surface is accelerated and the quality of coating is affected.

Bath Alloying Elements : Alloying elements such as aluminium, tin and antimony are used in small quantities ranging from 0.02% to 1% to give brightness to the zinc coating.

Immersion Time : The thickness of coating increases with increase in immersion time. The duration of immersion is usually in the range of 1 to 5 minutes. For best results, the components should be submerged as rapidly as possible.

Withdrawal Rate : To provide a uniform coating of minimum thickness, the components are withdrawn from the zinc bath slowly and at a controlled rate; this permits maximum drainage. The optimum withdrawal rate for most articles is about 0.025 metres per second.

Cooling of Coated Parts : The coating can continue to diffuse at an elevated temperature after the surface layer of zinc has frozen. This type of post-immersion diffusion may occur if cooling is hindered by stacking of the parts, or retention of heat due to excessive cross-sectional area of the dipped part. Diffusion may convert part or whole of

the pure zinc layer to iron-zinc alloys, decolouring the surface and affecting its properties. To overcome this problem, parts taken out of the zinc bath should be spaced out adequately to ensure free circulation of air. Parts with heavy cross-sectional area will require forced cooling with air or water.

QUALITY CONTROL

To ensure that the raw materials having the required physical and chemical properties are used, it is desirable to sample test them. In addition, test certificates may also be called for from suppliers of raw materials.

Inspection at every stage of operation may not be necessary. In general, it will depend on the process involved. However, it is important that each member of the tower is inspected before it is sent for galvanising. Exhibit-9 gives permissible dimensional tolerances.

TESTING

As for any other electrical equipment, transmission towers also require 'type tests' and 'routine tests'. Type tests, applicable to new designs are required to ascertain the ability of towers to withstand the loads for which they are designed. Only after passing such a test, can commercial production of towers with the new design commence. Routine tests are carried out in the case of proven tower designs. These tests are less elaborate and are carried out during the normal production cycle.

Type Tests

Type tests are carried out with full-scale prototype towers. A permanent station is required for carrying out these tests where applied loads and corresponding deflections can be measured. The schematic outline of a typical tower testing station is shown in Exhibit-10.

A tower testing station consists of the following :

- o A test bed to withstand bending and torsional moments and shear, up to destruction.

  The most suitable one is an R.C.C. raft over pile foundation. On this, two sets of slit holed joists are laid at right angles to each other with adjustable caps to fix tower legs of any dimension. These joists are anchored suitably and strongly to the R.C.C. raft.

- o Permanent anchorage to take transverse, longitudinal and vertical pulls applied to towers.

  Longitudinal tower (L) is a structure approximately 60 M tall, constructed at a distance of 50-60 M from the tower bed. This tower is equipped with all rigging arrangements for applying longitudinal loads. Transverse loads are applied through pulleys positioned on the transverse intermediate mast (T). Vertical loads are applied by means of dead weight or through anchors.

- o Arrangements for applying different combinations of loads.

These include manually operated winches and electrically operated winches.

- Load and deflection measuring instruments such as mechanical spring gauges, theodolites and electrical/electronic controlled transducers/dynamometers. Readings from these instruments are recorded in a central control room. The control room has a full view of the testing arrangements and the test tower.

  All instruments are checked for correctness and are calibrated before and after carrying out the tests to ensure reliability of measurements and validity of tests.

The following tests are carried out :

- Bolt take-up test
- Test with simultaneous loads under normal conditions
- Test with simultaneous loads under broken wire conditions
- Destructive test

All these tests are carried out after the prototype tower is erected on the test bed and a visual inspection of the members, nuts and bolts is completed.

Bolt take-up test

While the tower is subjected to various loads, there is some deflection due to light take-up of the clearances of about 1.5 mm between the bolts and the holes throughout the

structure. This test is carried out only to eliminate as far as possible, the take-up from actual deflection due to loading. Resultant readings after this test are taken as the initial readings for subsequent tests.

This test involves gradual loading at the peak and cross-arm levels of the tower in the vertical and transverse directions. Loads up to 75% of the working load are applied, separately or simultaneously, in different directions. Deflections are measured at each stage of loading and after release of loads.

Test with simultaneous loads under normal conditions

In this test, the tower is loaded under normal conditions in the transverse and vertical directions, to ensure that it is able to withstand the designed load with a factor of safety of 2.0. Vertical loads, equivalent to 100% of the working load are applied first; thereafter, transverse loads are applied in steps upto 100% of the working load. Both of these are then increased to 200%. At each stage of loading and after release of loads, the deflections are noted. A permanent deflection of 25 mm for every 9 m height of tower may be assumed to be within permissible limits. The tower should withstand the above test without any sign of crippling or deformation of its members.

Test with simultaneous loads under broken wire conditions

This test represents loading of tower in the longitudinal and transverse directions with vertical loads applied, to meet its specifications with a factor of safety of 1.5. The transverse and vertical loads are first raised to the required values and maintained there, while the longitudinal

loads are gradually increased from 0 to 150 per cent of the working load. Deflections are noted at each stage of loading and after release of loads. The tower should stand this test without showing any sign of crippling or permanent deformation of its members.

Destructive Test

After the above test, the tower is loaded to the maximum, as in the test with simultaneous loads under normal conditions. Then the vertical loads are kept constant, and the transverse loads at all the loading points are uniformly increased in steps of 5 to 10 per cent, till failure occurs. The point of failure is easily detected from the release of load on the dynamometer. This release, incidentally, prevents the complete collapse of the tower. Such a test of destruction gives valuable information from the design point of view. It is not desirable to re-use any member of the tower that is tested, as these may have suffered strain beyond the elastic limit. The entire test tower has to be scrapped.

After the test is completed, a detailed report should be prepared incorporating results of all the tests along with photographs of the tower at different steps of loading.

ERECTION OF TOWER

Usually, manufacturers are required to erect the towers at site. Erection of towers comprises two stages :

- Stub setting
- Erection of superstructure

Stub Setting

Stub setting is done either by using a stub setting template or using the lower section or extension of the tower as the template.

Stub setting template is a device which is used to set the stubs of correct inclination and dimension inside the excavated pit. It is composed of a light, rigid, four-sided framework. Exhibit-11 depicts a stub setting template. The template is placed in the pits in such a way that the corners of the template are placed at the centre of each pit. The anchors or the stubs are bolted to this template and are held in position, until concrete has been poured. After the concrete has hardened, the holes can be filled with soil.

Erection of Superstructure

Towers may be assembled on the ground and then lifted into place by means of self-propelled derrick cranes or latticed-steel gin-poles. Very large towers are usually assembled in sections. These sections are lifted into place by means of cranes or gin-poles. If towers are required at inaccessible locations, these may be transported and assembled with the use of helicopters. If necessary, towers can be erected on the ground by the use of gin-poles moved from corner to corner, with the erection crew climbing up on the partially complete structure. This method may be used for small jobs which do not warrant the use of heavy cranes, or for very tall towers which are to be located at points beyond the reach of cranes, such as towers at river crossings.

Tightening of Nuts and Punching of Threads : All nuts are tightened properly using spanners of the correct size and torque. Tightening is progressively carried out, top downwards, care being taken to ensure that bolts at every level are tightened simultaneously. It needs to be ensured that bolts of proper size, with suitable spring washers are used. The threads of bolts projecting outside nuts should be punched at 3 positions on the diameter, to present the nuts from loosening during the life of tower. Nuts and bolts with damaged or loosened threads should not be used.

Painting of Joints : In case of galvanised towers, the joints and contact surfaces are not painted, except for towers located in coastal or highly polluted areas. However, in case of non-galvanised towers, the joints and contact surfaces are coated with a thick layer of aluminium zinc-rich paint.

Verticality of Erected Towers : The erected tower should be truly vertical. Tolerance limit for verticality shall be 1 in 360 of the tower height.

PROCESS FLOW CHART

The process flow stages from fabrication to testing for a prototype tower are summarised in Exhibit-12. The stages, beginning from fabrication to erection for the standard tower of proven design are listed in Exhibit-13.

JOB NO. : DCIL-105 EXHIBIT : 9

UNITED NATIONS INDUSTRIAL DEVELOPMENT ORGANIZATION
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PROJECT PROFILE ON HIGH VOLTAGE AND ULTRA HIGH VOLTAGE TOWERS

PERMISSIBLE DIMENSIONAL TOLERANCES

Straightness	:	No Tolerance
On length	:	Compression Members + 1.60 mm Tension Members - 1.60 mm Hole to hole distance + 0.80 mm
Holes	:	i) Holes shall be perfectly circular and no tolerance in this respect is permissible ii) The maximum allowable difference in the diameter of the holes on two faces of plate on angle is +1/32 inch or 0.8 mm. iii) Bolt holes, whether punched or drilled, shall not be more than 1/16th inch or 1.5 mm larger in diameter than the corresponding bolt diameter.
Corner cuts	:	+ 1.6 mm - 0.0 mm
Notching	:	+ 1.6 mm - 0.0 mm
Flange cuts	:	+ 0.0 mm - 1.6 mm
Bends, Joggles, Opening/closing	:	No Tolerance

JOB NO. : DCIL-105

EXHIBIT : 10

UNITED NATIONS INDUSTRIAL DEVELOPMENT ORGANIZATION
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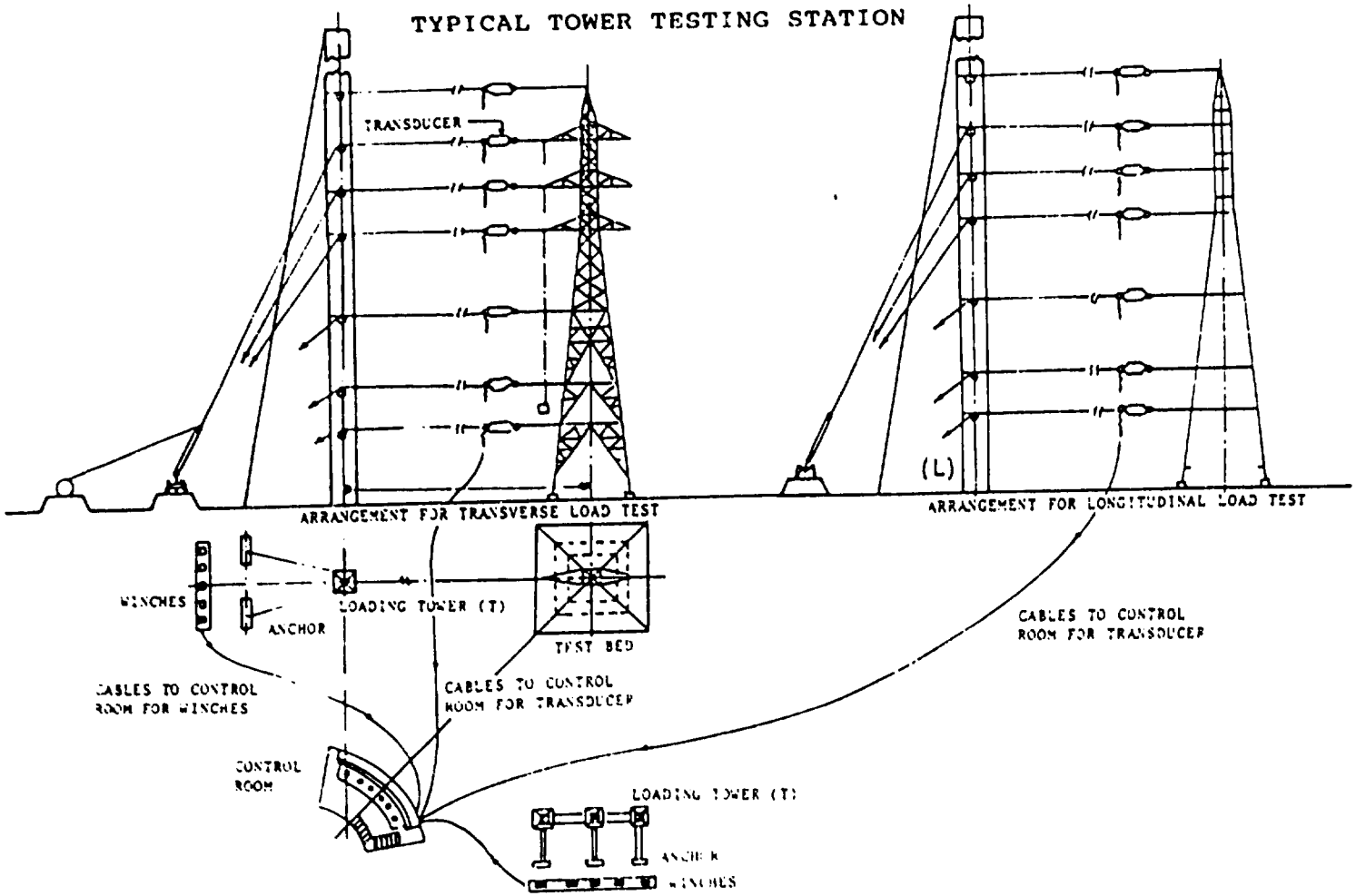
PROJECT PROFILE ON HIGH VOLTAGE AND ULTRA HIGH VOLTAGE TOWERS

TYPICAL TOWER TESTING STATION



JOB NO. : DCIL-105 EXHIBIT : 11

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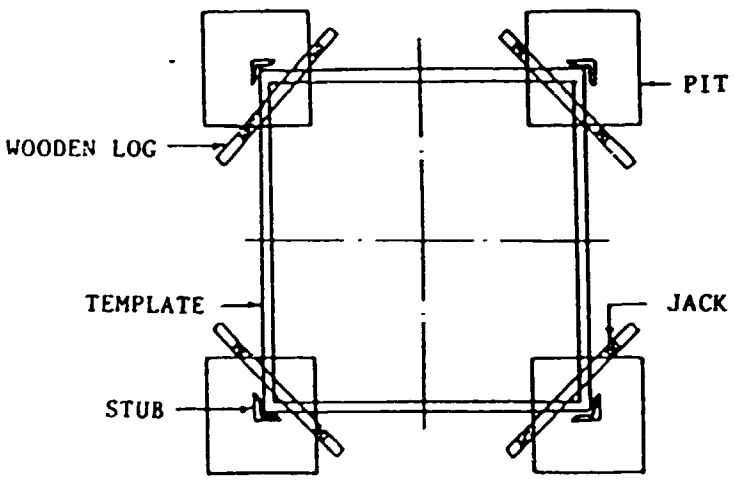
PROJECT PROFILE ON HIGH VOLTAGE AND ULTRA HIGH VOLTAGE TOWERS

STUB SETTING TEMPLATE



JOB NO. : DCIL-105 EXHIBIT : 12

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PROJECT PROFILE ON HIGH VOLTAGE AND ULTRA HIGH VOLTAGE TOWERS

PROCESS SEQUENCE FOR MANUFACTURE OF A PROTOTYPE TOWER

Sl. No.	Process
1.	Preparation of full-scale layout, shop drawings and templates
2.	Fabrication of angles and plates
3.	Inspection of parts
4.	Cleaning and dress up
5.	Marking identification marks
6.	Erection at testing site
7.	Testing and preparation of test reports
8.	Dismantling
9.	Disposing off the components to the storeyard

JOB NO. : DCIL-105 EXHIBIT : 13

UNITED NATIONS INDUSTRIAL DEVELOPMENT ORGANIZATION AND ARAB INDUSTRIAL DEVELOPMENT AND MINING ORGANIZATION

PROJECT PROFILE ON HIGH VOLTAGE AND ULTRA HIGH VOLTAGE TOWERS

PROCESS SEQUENCE FOR MANUFACTURE OF A STANDARD TOWER

Sl. No.	Process
1.	Preparation of full-scale floor layout, shop drawings and templates
2.	Fabrication of angles and plate
3.	Inspection of parts
4.	Cleaning and dress up
5.	Marking identification marks
6.	Hot dip galvanizing
7.	Final inspection
8.	Bundling
9.	Despatch to site
10.	Erection

SECTION - 7
PLANT AND EQUIPMENT

PLANT AND EQUIPMENT

In order to meet annual demand for high voltage and ultra high voltage transmission towers in the designated region, the project will need nearly 126,000 tonnes of steel structures per annum. Considering economies of scale, it is planned to manufacture the above in four plants across the region.

A tower manufacturing plant requires machinery and equipment for carrying out the following functions :

- Production
- Tool Room
- Quality Control and Testing
- Material Handling
- Plant Maintenance
- Stores
- Utilities

Production

The tower manufacturing plant will be manufacturing transmission towers of capacities 66 KV, 132 KV, 220 KV and 400 KV.

Manufacturing process for transmission towers is identical, irrespective of capacity of plants or configuration of towers. Thus, a tower of a particular capacity may be taken as representative of all the towers. 220 KV transmission towers have the maximum demand; therefore, a typical 220 KV tower has been taken as representative for estimating the requirements of raw materials and other inputs, and of equipment.

It is assumed that the production shops will work for 2 shifts a day. The acid pickling and galvanising section usually work for 3 shifts a day. Exhibit-14 shows the number of machines required for carrying out various operations on tower components, separately for 36,000 TPA and 18,000 TPA plants. While estimating the requirement of machines, it has been assumed that each machine will have 70% utilisation.

Tool Room

The plant will use a number of punching, shearing, drilling, cropping and metal sawing tools. These tools need frequent resharpening and grinding. Punching and drilling operations also need a number of dies for punching, and jigs and fixtures for drilling. It is, therefore, necessary to equip the plant with tool room facilities.

Quality Control and Testing

When tested steel is purchased from authorised sources, it is accompanied by test certificates duly signed by recognised institutions. Even so, all incoming materials should be inspected before they are accepted in the stores. Transmission towers are erected at site. Therefore, it is important that all components are dimensionally accurate in all respects. This can be ensured only by planning for inspection stage-wise. Various types of measuring and surface testing instruments will therefore be required.

For testing of prototype towers, a tower testing station with suitable facilities is required to be provided.

Material Handling

Tower manufacturing involves handling of large number of angles and plates of varying weights. The 36,000 TPA plant is provided with 4 EOT cranes. In addition, there will be 2 engine-driven mobile cranes for loading and unloading of incoming materials, as also for moving them from the stockyard to the production shop. 4 forklift trucks and several hand trolleys have also been provided.

2 gantry cranes have been provided exclusively for the acid pickling and galvanising section.

Auxiliary Equipment

Auxiliary equipment will include surface plate, work bench, workers' tool cabinet, storage racks, wooden skids, tote box, stillages, storage shelf, pallets, gravity roller carrier, office furniture and appliances, etc.

Utilities

Utilities in the plant are discussed under Section-9 of this Report.

Brief specifications of all recommended equipment are shown in Exhibit-15. Hand tools, measuring tools and other miscellaneous tools for production and maintenance needed in the plant, are also listed in the above Exhibit.

JOB NO. : DCIL-105

EXHIBIT : 14

UNITED NATIONS INDUSTRIAL DEVELOPMENT ORGANISATION
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PROJECT PROFILE ON HIGH VOLTAGE AND ULTRA HIGH VOLTAGE TOWERS

REQUIREMENT OF EQUIPMENT CLASSIFIED BY ACTIVITY

Sl. No.	Operation	Components	Variation of Size (mm) From	To	Pieces per Shift 18000 TPA	36000 TPA	Weight per Shift (kg) 18000 TPA	36000 TPA	Machinery	No. of Machines 18000 TPA	36000 TPA
1.	Cut to size	Angle	45x30x5	150x150x10	840	1680	24190	48380	i) Universal Punching, Cropping, Shearing and Notching Machine	2	4
									ii) Cold Circular Saw	2	4
2.	Straightening	Angle	45x30x5	150x150x10	840	1680	24190	48380	Beam Bending and Straighening Machine	2	4
3.	Bending	Angle	45x30x5	100x100x8	224	448	6450	12900	i) Hydraulic Press	2	4
									ii) Heating Furnace	1	2
4.	Bevel Cut at Both Ends	Angle	45x30x5	75x75x6	240	480	6912	13824	Hand Gas Cutting Set	4	4
5.	Corner Cut at Both Ends	Angle	45x30x5	75x75x6	138	276	3992	7984	Notching Machine	1	2
6.	Heel Chamfering	Lap Joint	Thickness 6 - 18		64	128	360	720	Shaping Machine	1	2

JOB NO. : DCIL-105

EXHIBIT : 14

Sl. No.	Operation	Components	Variation of Size (mm) From	To	Pieces per Shift 18000 TPA	36000 TPA	Weight per Shift (kg) 18000 TPA	36000 TPA	Machinery	No. of Machines 18000 TPA	36000 TPA
7.	Deburring and Smoothening of Cut Edges	Angle	45x30x5	150x150x10	840	1680	24190	48330	Pedestal Grinder Hand Grinder	3 3	6 3
8.	Marking	Angle	Dia 13.5 - 25.5		5368 Holes	10736 Holes	-	-	Marking Tools		
9.	Drilling	Angle	Dia 13.5 - 25.5		5368 Holes	10736 Holes	-	-	Radial Drilling Machine	6	12
10.	Cut to Size	Plate	40x85x6	1244x253x14	504	1008	2842	5684	i) Guillotine Shearing Machine	1	2
									ii) Cross Carriage Profile Cutting Machine	1	2
11.	Bending	Plate	40x85x6	1244x253x14	504	1008	2842	5684	Press Brake	1	2
12.	Heel Chamfering	Cover Cleat	Thickness 8 - 14		312	624	1757	3514	Shaping Machine	1	2
13.	Deburring and Smoothening of Cut Edges	Plate	Thickness 6 - 14		504	1008	-	-	Pedestal Grinder	2	4
14.	Marking	Plate	Dia 13.5 - 25.5		1165 Holes	2330 Holes	-	-	Marking Tools		
15.	Drilling	Plate	Dia 13.5 - 25.5		1165 Holes	2330 Holes	-	-	Pillar Drilling Machine	6	12
16.	Marking for Identification	Angle Plate	45x30x5 40x85x6	150x150x10 1244x1076x14	840 504	1680 1008	- -	- -	Marking Press	5	10

JOB NO. : DCIL-105

EXHIBIT : 14

Sl. No.	Operation	Components	Variation of Size (mm) From	To	Pieces per Shift 18000 TPA	36000 TPA	Weight per Shift (kg) 18000 TPA	36000 TPA		Machinery	No. of Machines 18000 TPA	36000 TPA
17.	Cleaning and Surface	Angle	45x30x5	150x150x10	560	1120	16126	32252	i)	Acid Pickling Tank	1	2
		Plate	40x85x6	1244x1076x14	336	672	1895	3790				
									ii)	Water Rinsing Tank	1	2
18.	Hot Dip Galvanising	Angle	45x30x5	150x150x10	560	1120	16126	32252	i)	Galvanising Tank	1	2
		Plate	40x85x6	1244x1076x14	336	672	1895	3790				
		Nuts & Bolts			4355	8710	820	1640	ii)	Oil Fired Furnace	1	2
		Washer			4355	8710	704	1408				
									iii)	Centrifuge	1	2
19.	Bundling	Angle	45x30x5	150x150x10	840	1680	24190	48380				
		Plate	40x85x6	1244x1076x14	504	1008	2842	5684		Carpentry Tools		
		Nuts & Bolts			6532	13064	1230	2460				
		Washer			6532	13064	1056	2112				

JOB NO. : DCIL-105

EXHIBIT : 15

UNITED NATIONS INDUSTRIAL DEVELOPMENT ORGANISATION
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ARAB INDUSTRIAL DEVELOPMENT AND MINING ORGANISATION

PROJECT PROFILE ON HIGH VOLTAGE AND ULTRA HIGH VOLTAGE TOWERS

LIST OF EQUIPMENT AND BRIEF SPECIFICATIONS

Sl. No.	Name of the Equipment	Brief Specification	18000 TPA Nos. Required	18000 TPA Power Consumption (KW)	36000 TPA Nos. Required	36000 TPA Power Consumption (KW)	Unit Price ($)	Total Price $ 18,000 TPA	Total Price $ 36,000 TPA
Production									
1.	Universal punching, Cropping, Shearing and Notching Machine	Max. Capacity to cut Angles : 150 x 150 x 14 mm	1	11.0	2	22.0	51,300	51,300	1,02,600
2.	Universal Punching, Cropping, Shearing and Notching Machine	Max. Capacity to cut Angles : 80 x 80 x 10 mm	1	7.5	2	15.5	49,000	49,000	98,000
3.	Cold Circular Saw for Metal Cutting	Max. Cutting Capacity - Rounds : 225 mm - Squares : 200 mm	2	20.0	4	40.0	48,600	97,200	1,94,400

DEVELOPMENT CONSULTANTS

JOB NO. : DCIL-105

EXHIBIT : 15

Sl. No.	Name of the Equipment	Brief Specification		18000 TPA Nos. Required	18000 TPA Power Consumption (KW)	36000 TPA Nos. Required	36000 TPA Power Consumption (KW)	Unit Price ($)	Total Price ($) 18,000 TPA	Total Price ($) 36,000 TPA
4.	Beam Bending and Straighte-ning Machine	Type	: Ram Type	2	30.0	4	60.0	56,670	1,13,340	2,26,680
		Capacity	: 250 Tonnes							
		Ram Stroke	: 630 mm							
		Table Width	: 2500 mm							
5.	Hydraulic Press	Max. Capacity	: 200 Tonnes	2	60.0	4	120.0	59,250	1,18,500	2,37,000
6.	Furnace	Type	: Oil Fired Box Type Batch Furnace	2	1.0	4	2.0	80,650	1,61,300	3,22,600
		Max. Heating Temperature	: 1450° C							
		Chamber Area	: 1000 x 800 mm							
7.	Notching Machine	Max. Capacity to Notch Angles	: 100 x 100 x 12	1	7.5	2	15.0	6,500	6,500	13,000
		Notching Width	: 60 mm							
		Notching Depth	: 90 mm							

DEVELOPMENT CONSULTANTS

JOB NO. : DCIL-105

EXHIBIT : 15

Sl. No.	Name of the Equipment	Brief Specification		18000 TPA Nos. Required	18000 TPA Power Consumption (KW)	36000 TPA Nos. Required	36000 TPA Power Consumption (KW)	Unit Price ($)	Total Price ($) 18,000 TPA	Total Price ($) 36,000 TPA
9.	Shaping Machine	Max. Stroke Length	: 660 mm	2	15.0	4	30.0	34,240	68,480	1,36,960
		Table Size	: 570 x 560 mm							
		Horizontal Travel on Slides	: 760 mm							
		Vertical Travel	: 355 mm							
9.	Pedestal Grinder	Type	: Double Wheel Heavy Duty	5	19.0	10	38.0	1,200	6,000	12,000
		Wheel Size	: 400 x 50 x 120 mm							
		Wheel Centre Distane	: 700 mm							
10.	Pillar Drilling Machine	Max. Drilling Capacity in Steel	: 25 mm	6	5.0	12	10.0	1,065	6,390	12,780
		Table Size	: 435 x 530 mm							
11.	Radial Drilling Machine	Max. Drilling Capacity in Steel	: 40 mm	6	36.0	12	72.0	18,370	1,10,220	2,20,440
		Max. Drilling Radius	: 1500 mm							

JOB NO. : DCIL-105

EXHIBIT : 15

Sl. No.	Name of the Equipment	Brief Specification		18000 TPA Nos. Required	18000 TPA Power Consumption (KW)	36000 TPA Nos. Required	36000 TPA Power Consumption (KW)	Unit Price ($)	Total Price ($) 18,000 TPA	Total Price ($) 36,000 TPA
12.	Guillotine Shearing Machine	Type	: Hydraulic	1	15.0	2	30.0	49,600	49,600	99,200
		Shearing Thickness	: 10 mm							
		Depth of Gap	: 300 mm							
		Shearing Width	: 2500 mm							
13.	Cross Carriage Profile Cutting Machine	Type of Fuel Gas	: Acetylene	1	1.0	2	2.0	19,640	19,640	39,280
		Tracing Width	: 2 m							
		Tracing Table Length	: 1.5 m							
		Cutting Width	: 2.5 m							
		Cutting Length	: 2.0 m							
14.	Press Brake	Type	: Hydraulic	1	45.0	2	90.0	70,850	70,850	1,41,700
		Max. Capacity	: 250 Tonnes							
		Desk Length	: 3200 mm							
		Distance between Housings	: 2500 mm							
		Stroke Length	: 200 mm							

JOB NO. : DCIL-105

EXHIBIT : 15

Sl. No.	Name of the Equipment	Brief Specification		18000 TPA Nos. Required	18000 TPA Power Consumption (KW)	36000 TPA Nos. Required	36000 TPA Power Consumption (KW)	Unit Price ($)	Total Price ($) 18,000 TPA	Total Price ($) 36,000 TPA
15.	Marking Press (Die Punch Marking Machine)	Capacity	: 70 Tonnes and 6 Letters of size 19 mm	5		10	7.5	4,970	24,850	49,700
16.	Acid Pickling Tank	Capacity	: 8 x 1.5 x 1.5 m	1		2	-	12,000	12,000	24,000
17.	Rinsing Bath Fitted with Water Sprinkler	Capacity	: 8 x 1.5 x 1.5 m	1		2	-	12,000	12,000	24,000
	Galvanising									
1.	Galvanising Tank equipped with Oil Fired Furnace and Allied Accessories	Capacity	: 8 x 1.5 x 1.5 m	1		2	-	12,000	12,000	24,000
2.	Centrifuge									
							Sub-total		9,89,170	19,78,340
	Tower Testing Station	Prototype Tower Testing Station suitably equipped for testing upto 400 KV Transmission Towers (included in cost of land)								

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EXHIBIT : 15

Sl. No.	Name of the Equipment	Brief Specification	18000 TPA Nos. Required	18000 TPA Power Consumption (KW)	36000 TPA Nos. Required	36000 TPA Power Consumption (KW)	Unit Price ($)	Total Price ($) 18,000 TPA	Total Price ($) 36,000 TPA
Tool Room Equipment									
1.	Cold Saw Cutter Grinder	Dia of Circular Saw Cutter : 150 to 600 mm Dia of Grinding Wheel : 250 mm Grinding Capacity : 30 to 60 teeth per minute	1	1.0	1	1.0	800	800	800
2.	Shearing and Cropping Blade Grinder	Size of Grinding Wheel : 300 mm Length of Blade : 1200 mm	1	4.0	1	4.0	1,000	1,000	1,000
3.	Drill Point Grinder	Size of Drill to be ground : 6 mm to 50 mm Inluded Point Angle : 90° to 150°	1	2.0	1	2.0	1,100	1,100	1,100

DEVELOPMENT CONSULTANTS

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EXHIBIT : 15

Sl. No.	Name of the Equipment	Brief Specification		18000 TPA		36000 TPA		Unit Price ($)	Total Price ($)	
				Nos. Required	Power Consumption (KW)	Nos. Required	Power Consumption (KW)		18,000 TPA	36,000 TPA
4.	Universal Cylindrical Grinder	Height of Centres	: 175 mm	1	6.0	1	6.0	2,000	2,000	2,000
		Distance between Centres	: 625 mm							
		Internal Grinding Dia	: 25 - 200 mm							
		Depth of Grinding	: 125 - 200 mm							
5.	Bench Grinder	Wheel Size	: 250 x 25 x 25 mm	2	2.0	2	2.0	1,000	2,000	2,000
6.	Precision Column Drilling Machine	Drilling Capacity in Steel	: 50 mm	1	4.0	1	4.0	970	970	970
		Table Size	: 760 x 610 mm							
7.	Precision Lathe	Centre Height	: 220 mm	1	11.0	1	11.0	3,100	3,100	3,100
		Distance between Centres	: 1500 mm							

JOB NO. : DCIL-105

EXHIBIT : 15

Sl. No.	Name of the Equipment	Brief Specification		18000 TPA Nos. Required	18000 TPA Power Consumption (KW)	36000 TPA Nos. Required	36000 TPA Power Consumption (KW)	Unit Price ($)	Total Price ($) 18,000 TPA	Total Price ($) 36,000 TPA
9.	Universal Milling Machine	Overall Table Dimension	: 1520 x 310 mm	1	7.0	1	7.0	20,830	20,830	20,830
		Clamping Area (L x W)	: 1350 x 310 mm							
9.	Electric Heat Treatment Furnace and Quenching Tank	Chamber Size	: 300 x 300 x 150 mm	1	7.0	1	7.0	48,000	48,000	48,000
		Temperature Range	: 700° - 1250° C							
		Cycle Time for Heating to Full Temperature	: 2 hours							
10.	Arc Welding Set	Welding Current Range	: 70 - 450 A	1	12.0	1	12.0	1,590	1,590	1,590
11.	Rectifier D.C. Welding Set	Welding Current Range	: 55 - 500 A	1	25.0	1	25.0	1,650	1,650	1,650
12.	Stencil Cutting Machine	Letter Size	: 19 mm	1	-	1	-	500	500	500
								Sub-total	83,540	83,540

JOB NO. : DCIL-105

EXHIBIT : 15

Sl. No.	Name of the Equipment	Brief Specification		18000 TPA Nos. Required	18000 TPA Power Consumption (KW)	36000 TPA Nos. Required	36000 TPA Power Consumption (KW)	Unit Price ($)	Total Price ($) 18,000 TPA	Total Price ($) 36,000 TPA
Material Handling										
1.	E O T Crane	Capacity	: 5 Tonnes	1	15.0	2	30.0	37,800	37,800	75,600
		Span *	: 13 m							
		Class	: III							
2.	E O T Crane	Capacity	: 10/5 Tonnes	1	30.0	2	60.0	56,680	56,680	1,13,36[illegible]
		Span*	: 13 m							
		Class	: III							
3.	Gantry Crane	Capacity	: 3 Tonnes	1	10.0	2	20.0	20,000	20,000	40,000
		Span*	: 4 m							
		Class	: IV							
4.	Engine Driven Mobile Crane	Overall Jib Length	: 11.5 m	1	-	2	-	65,220	65,220	1,30,440
		Max. Lifting Capacity at 3 m Radius	: 8 Tonnes							

* The spans are provisional. Final spans will be determined when the workshop building is designed.

DEVELOPMENT CONSULTANTS

JOB NO. : DCIL-105

EXHIBIT : 15

Sl. No.	Name of the Equipment	Brief Specification		18000 TPA Nos. Required	18000 TPA Power Consumption (KW)	36000 TPA Nos. Required	36000 TPA Power Consumption (KW)	Unit Price ($)	Total Price ($) 18,000 TPA	Total Price ($) 36,000 TPA
5.	Forklift Truck	Type	: Battery Operated	2	-	4	-	24,750	49,500	99,000
		Capacity	: 1.5 Tonnes							
		Load Centre	: 500 mm							
		Max. Lift	: 3.66 m							
6.	Truck	G V W	: 15240 kgs	2	-	4	-	9,500	19,000	38,000
7.	Hand Push Trolleys	Capacity	: 500 kgs	2	-	4	-	70	140	280
8.	Double Wheel Barrows	Type	: Heavy Duty	2	-	4	-	100	200	400
		Capacity	: 0.2 m^3				Sub-total		2,48,540	4,97,080
Maintenance Tools										
1.	Hydraulic Jack	Type	: Remote Control pumping unit with screwed ram and safety lock, operating handle and high pressure metallic tube connection to feed oil	4	-	8	-	200	800	1,600

JOB NO. : DCIL-105

EXHIBIT : 15

Sl. No.	Name of the Equipment	Brief Specification		18000 TPA Nos. Required	18000 TPA Power Consumption (KW)	36000 TPA Nos. Required	36000 TPA Power Consumption (KW)	Unit Price ($)	Total Price ($) 18,000 TPA	Total Price ($) 36,000 TPA
		Capacity	: 10 Tonnes							
		Closed Height	: 298 mm							
		Hydraulic Lift	: 150 mm							
		Max. Height	: 448 mm							
2.	Screw Jack	Type	: Ratchet type, lifting and traversing screw jacks	4	-	8	-	300	1,200	2,400
		Capacity	: 5 Tonnes							
		Closed Height	: 500 mm							
		Lift	: 200 mm							
		Dia of Head	: 88 mm							
3.	Chain Pulley Block	Type	: Balanced Spur Gear Fixed Mounting	1	-	2	-	150	150	300
		Load Capacity	: 2 Tonnes SWL							
		Lift	: 3 m							

JOB NO. : DCIL-105

EXHIBIT : 15

Sl. No.	Name of the Equipment	Brief Specification		18000 TPA Nos. Required	18000 TPA Power Consumption (KW)	36000 TPA Nos. Required	36000 TPA Power Consumption (KW)	Unit Price ($)	Total Price ($) 18,000 TPA	Total Price ($) 36,000 TPA
4.	Collapsible Ladder	Type	: Self-supporting extendable all Aluminium Ladder	1	-	2	-	150	150	300
		Closed Height	: 5 m							
		Extended Height	: 9 m							
5.	Tachometer	Speed Range	: 0-5000 rpm	2	-	4	-	50	100	200
6.	Pressure Gauge	Pressure Range	: 0-100 kg/cm^2					100	100	100
7.	Grease Gun	Type	: Lever Type					50	50	50
		Capacity	: 400 gas							
8.	Battery Charger	No. of Phases	: 3					100	100	100
		Input Voltage	: 240 V							
		Output Voltage	: 36 V							

DEVELOPMENT CONSULTANTS

JOB NO. : DCIL-185

EXHIBIT : 15

Sl. No.	Name of the Equipment	Brief Specification	18000 TPA Nos. Required	18000 TPA Power Consumption (KW)	36000 TPA Nos. Required	36000 TPA Power Consumption (KW)	Unit Price ($)	Total Price ($) 18,000 TPA	Total Price ($) 36,000 TPA
9.	Puller	3 legged forged pullers for bearings,							
		Size : 500 mm	1	-	2	-	25	25	50
		: 400 mm	1	-	2	-	25	25	50
		: 300 mm	1	-	2	-	25	25	50
10.	Plumb Ball	Brass with Steel Point	2	-	4		20	40	80
		Weight : 4 Oz							
11.	Vibration Meter	Portable, battery operated	1	-	2	-	100	100	200
12.	Ammeter	Type : Moving iron type suitable for both AC and DC upto 100 amps	1	-	2	-	80	80	160
		Accuracy : ± 1% on effective scale							
13.	Voltmeter	Type : Moving iron AC and DC type upto 500 volts	1	-	2	-	100	100	200
		Accuracy : ± 1% on effective scale							

JOB NO. : DCIL-105

EXHIBIT : 15

Sl. No.	Name of the Equipment	Brief Specification	18000 TPA Nos. Required	18000 TPA Power Consumption (KW)	36000 TPA Nos. Required	36000 TPA Power Consumption (KW)	Unit Price ($)	Total Price ($) 18,000 TPA	Total Price ($) 36,000 TPA
14.	Meg Ohm Meter	Heavy duty hand operated meg ohm meter with shielded voltage leads and ground leads	1	-	2	-	100	100	200
		Voltage Range : 0-11000 V							
15.	Multimeter (Ava Meter)	Portable battery operated multimeter with built-in overload protective circuitry	1	-	2	-	130	130	260
		Voltage : 100-1500 V AC/DC							
		Current : 100 mA - 2 A AC/DC							
		Resistance : 100-200 meg ohm							
16.	Electric Soldering Iron	Supply Voltage : 240 V Single Phase 50 Hz							
		Power Rating : 100 watts	2	-	4	-	40	80	160
		: 60 watts	2	-	4	-	30	60	120
							Sub-total	3,415	6,580

Miscellaneous Hand Tools

- Measuring and Marking Tools including Measuring Tape, Rule, Caliper, etc.

Sl. No.	Name of the Equipment	Brief Specification	18000 TPA Nos. Required	18000 TPA Power Consumption (KW)	36000 TPA Nos. Required	36000 TPA Power Consumption (KW)	Unit Price ($)	Total Price ($) 18,000 TPA	Total Price ($) 36,000 TPA
o	Vises and Clamps								
o	Hammers								
o	Drills and Cutting Tools								
o	Countersinks, Taps, Dies and Reamers								
o	Wrenches, Pliers and Screw Drivers								
o	Welding Accessories						Lump sum	1,500	2,000
Auxiliary Equipment									
1.	Weighbridge	Type : Lever Type, Road Transport	1	-	2	-			
		Capacity : 25 Tonnes							
		Platform Size (L x W) : 8 x 3 m							
2.	Portable Platform Weighing Scale	Type : Arm	1	-	2	-			
		Capacity : 500 kgs							

JOB NO. : DCIL-105 EXHIBIT : 15

Sl. No.	Name of the Equipment	Brief Specification	18000 TPA Nos. Required	18000 TPA Power Consumption (KW)	36000 TPA Nos. Required	36000 TPA Power Consumption (KW)	Unit Price ($)	Total Price ($) 18,000 TPA	Total Price ($) 36,000 TPA
3.	Surface Plate	Surface plate made of close grained C.I. of 200 BHN sturdy angle iron frame and adjusting jacks Top Surface Size : 2000 x 1000 mm Overall Height of Table : 286 mm	2	-	4	-			
4.	Work Bench	50 mm laminated wood top in a angle iron frame with four angle iron legs Area of Top Surface : 2000 x 850 mm Floor to Top Height : 900 mm	4	-	8	-			
5.	Workers' Tool Cabinet	Steel cabinets consisting of two shelves Size (W x D x H) : 600 x 450 x 750 mm	70	-	140	-			
6.	Bar, Pipe and Rod Storage Rack	Heavy duty double-arm six high storage rack of steel Capacity : 8 Tonnes	10	-	20	-			

JOB NO. : DCIL-105

EXHIBIT : 15

Sl. No.	Name of the Equipment	Brief Specification	18000 TPA Nos. Required	18000 TPA Power Consumption (KW)	36000 TPA Nos. Required	36000 TPA Power Consumption (KW)	Unit Price ($)	Total Price ($) 18,000 TPA	Total Price ($) 36,000 TPA
7.	All Steel Open Storage Rack	The rack shall have six shelves Overall Size (W x D x H) : 1200 x 450 x 1950 mm Capacity : 150 kg/cm²	10	-	20	-			
8.	Heavy Duty Wooden Skid	Made of hard wood with metal frame Top Surface : 900 x 1000 mm Load Capacity : 1500 kgs	10	-	20	-			
9.	Steel Tote Box	Welded steel construction covered with heavy duty wire mesh Size (L x W x D) : 1000 x 1000 x 450 mm	10	-	20	-			
10.	Stillages	Stillages shall be used for storing sheets, plates and long rolled section. It shall be made of welded structure. Size (L x H) : 3000 x 750 mm Width of a Frame : 300 mm	20	-	40	-			

JOB NO. : DCIL-105

EXHIBIT : 15

Sl. No.	Name of the Equipment	Brief Specification	18000 TPA Nos. Required	18000 TPA Power Consumption (KW)	36000 TPA Nos. Required	36000 TPA Power Consumption (KW)	Unit Price ($)	Total Price ($) 18,000 TPA	Total Price ($) 36,000 TPA
11.	Closed Storage Shelf	Welded steel sheet shelf with lockable doors	4	-	8	-			
		Overall Height : 2000 mm							
		Tray Dimensions (W x D): 1000 x 450 mm							
		Load Capacity : 500 kg/cm²							
12.	Gravity Roller Conveyor	Length of Track : 12 m	6	-	12	-			
		Width of Track : 1 m							
13.	Tube, Pipe, Bar and Angle Carrier	Capacity : 1 Tonne	10	-	20	-			
		: 2 Tonnes	10	-	20	-			
		Max. Length of Angle (for both 1 Tonne and 2 Tonnes) : 2.5 m							
							Lump sum	3,500	5,000
							Sub-total	5,000	7,000
							TOTAL	13,29,665	25,72,540

SECTION - 8
RAW MATERIALS AND OTHER INPUTS

RAW MATERIALS AND OTHER INPUTS

The tower manufacturing plant is designed to fabricate 36,000 tonnes of steel towers annually. The basic materials, consumables and bought-out items required for manufacturing towers have been classified under the following major groups :

- Steel sections including angles, channels and plates
- Nuts, bolts and washers as bought-out items
- Sulphuric acid, iron sulphate, sodium hydroxide, ammonium chloride, glycerine, etc., for acid pickling
- Zinc for hot dip galvanising
- Aluminium as alloying element for galvanising bath
- Consumables like oils and grease for lubrication, paints, furnace oil, metal cutting oil, etc.

Technical specifications and annual requirements of these materials are shown in Exhibit-16.

The quantity of zinc required for hot dip galvanising has been estimated as per ASTM specifications A-123, which suggest an average coating of 0.61 kg of zinc per square metre of surface area.

While estimating the requirement of basic materials like angles, plates and other sections, quantity of waste has been assumed at 10%. A waste factor of 10% has also been

considered in estimating the requirement of nuts, bolts, washers and other hardware. In case of sulphuric acid and zinc, the loss will be much higher; and hence, wastage at 20% has been assumed.

Stocks required for 2 months' production, may be maintained for locally available materials. For imported items, stocks required for 4 months' production may be held.

JOB NO. : DCIL-105 EXHIBIT : 16

UNITED NATIONS INDUSTRIAL DEVELOPMENT ORGANIZATION
AND
ARAB INDUSTRIAL DEVELOPMENT AND MINING ORGANIZATION

PROJECT PROFILE ON HIGH VOLTAGE AND ULTRA HIGH VOLTAGE TOWERS

REQUIREMENT OF RAW MATERIALS AND CONSUMABLES

Sl. No.	Component	Material Specifications	18000 TPA Yearly Requirement (Tonnes)	18000 TPA Price ('000 US$)	36000 TPA Yearly Requirement (Tonnes)	36000 TPA Price ('000 US$)
1.	Angles	Rolled Steel Section as per BS 4848 (Structural Steel)	16774	5535.4	33548	11070.84
2.	Plate	As per BS 5535	2112	612.48	4224	1224.96
3.	Nuts and Bolts	As per BS 6565	914	447.86	1828	895.72
4.	Sulphuric Acid	As per BS 753	1.8	0.174	3.6	0.349
5.	Chemicals like Sodium Hydroxide and Ammonium Chloride	As per BS 4130	Lumpsum	0.500	Lumpsum	1.00
6.	Zinc	As per BS 729	220	387.2	440	774.40
7.	Primer and Paints	Synthetic Enamel	12000 Litres	185.76	24000 Litres	371.52

DEVELOPMENT CONSULTANTS

JOB NO. : DCIL-105

EXHIBIT : 16

Sl. No.	Component	Material Specifications	18000 TPA Yearly Requirement (Tonnes)	18000 TPA Price ('000 US$)	36000 TPA Yearly Requirement (Tonnes)	36000 TPA Price ('000 US$)
8.	Grease and Lubricating Oil	Bearing Quality	0.80	0.680	1.60	1.360
9.	Furnace Oil	As per BS 2869	5	4.850	10	9.700
10.	Packing wood for boxes and galvanised wire for tying	25 mm thick x 30000 m^2	72	6.451	144	12.903
11.	Miscellaneous items like soaps, cotton waste, kerosene oil, cutting oil, cutting gas, maintenance hardware, refractory bricks, welding, electrodes, tool and die steel, etc.	Standard	Lumpsum	3.22	Lumpsum	5.00
			TOTAL	7184.575		14367.752

SECTION - 9
UTILITIES

UTILITIES

The plant will require utilities like power, water, compressed air and fuel oil.

Power

The requirement of power is summarised in Exhibit-17. While calculating the total load, power required for plant operation, general lighting, air-conditioning (administrative building), etc., were considered. As all power consuming units will not always be operated at the same time, the following load factors have been assumed for various categories :

Production equipment including material handling equipment	0.4
Tool room equipment	0.3
Lighting in the plant	0.5
Air-conditioning and air circulation	0.7
Miscellaneous	0.4

Based on the above load factors and a power factor of 0.8, the total requirement of power works out to 695 KVA and 410 KVA, for the 36,000 TPA and 18,000 TPA plants respectively. Considering the power rating required for production equipment and services to be 415/220 volts, one transformer of 1000 KVA and another of 500 KVA have been provided for these plants. It is assumed that the power will be tapped from an 11 KV overhead transmission line. Thus, the transformer will have a step down ratio from 11 KV to 415/220 volts.

Water

The plant will need water for the following purposes :

- o as coolant for metal cutting tools
- o for acid pickling and water rinsing of tower components
- o for cooling the central air-conditioning system
- o for drinking and cooking
- o sanitation and personal use
- o gardening and shop floor cleaning

Requirement of water for these purposes is shown in Exhibit-18.

It is proposed that the 36,000 TPA plant be equipped with a 4" dia deep tubewell, 2 pumps of 190 litres per minute capacity each, and one overhead tank of 20 m^3 storing capacity.

Compressed Air

Compressed air will be required for firing the furnace, for operating spray guns and for painting. In the case of a 36,000 TPA plant, there will be 2 compressors, each capable of delivering air at the rate of 1 m^3 per minute at a pressure of 7 kg per cm^2.

Fuel Oil

The furnaces for the galvanising and acid pickling tank are oil-fired, and therefore, require a constant supply of oil. Each furnace shall have its own overhead oil tank. Pumps,

valves, piping and instrumentation will also be provided. It is estimated that the total oil requirement will be about 34 kg per day for the 36,000 TPA plant.

Air-conditioning

The administrative building will have a central air-conditioning system and individual air handling units for each floor. The system shall have a separate cooling tower of the induced draft type for cooling water. The workshop is provided with air coolers for air circulation.

Major equipment and accessories for all utilities are listed in Exhibit-19.

JOB NO. : DCIL-105 EXHIBIT : 17

UNITED NATIONS INDUSTRIAL DEVELOPMENT ORGANIZATION AND ARAB INDUSTRIAL DEVELOPMENT AND MINING ORGANIZATION

PROJECT PROFILE ON HIGH VOLTAGE AND ULTRA HIGH VOLTAGE TOWERS

SUMMARY OF POWER REQUIREMENT

Sl. No.	Description	Power Consumption (KW) 18000 TPA	36000 TPA
	Voltage 415/220 Volts		
1.	Production Equipment inclusive of Material Handling Equipment	403	806
2.	Tool Room Equipment	81	81
3.	General Lighting	116	223
4.	Air-conditioning and Air Circulation	112	120
5.	Miscellaneous (Canteen Equipment, Water Pump, Compressor, etc.)	15	30
	Total	727	1260
	Total Power required based on different Load Factors	328	555
	KVA Consumption (based on 0.8 Power Factor)	410	695

JOB NO. : DCIL-105 EXHIBIT : 18

UNITED NATIONS INDUSTRIAL DEVELOPMENT ORGANIZATION
AND
ARAB INDUSTRIAL DEVELOPMENT AND MINING ORGANIZATION

PROJECT PROFILE ON HIGH VOLTAGE AND ULTRA HIGH VOLTAGE TOWERS

WATER REQUIREMENT IN THE PLANT

Sl. No.	Purpose	Consumption (Ltrs/Day) 18000 TPA	36000 TPA
1.	Make up water for cooling metal cutting tools inclusive of water required for acid pickling and rinsing	3500	6200
2.	Drinking, cooking and sanitation (based on 100 litres per person per day)	41500	70700
3.	Water for cooling central air-conditioning plant	12360	12718
	Total	57360	89618
4.	Peak consumption per hour (litres)	14423	23753

JOB NO. : DCIL-105

EXHIBIT : 19

UNITED NATIONS INDUSTRIAL DEVELOPMENT ORGANIZATION
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ARAB INDUSTRIAL DEVELOPMENT AND MINING ORGANIZATION

PROJECT PROFILE ON HIGH VOLTAGE AND ULTRA HIGH VOLTAGE TOWERS

REQUIREMENT OF EQUIPMENT FOR UTILITIES

Sl. No.	Description	18000 TPA			36000 TPA		
		Nos.	Capacity	Price (US$)	Nos.	Capacity	Price (US$)
1.	Step down oil cooled transformer Step down ratio 11 KV to 415/220 volts 3 phase, 50 Hz	1	500 KVA	11,700	1	1000 KVA	21,900
2.	Switchgears, MCC, distribution boards, cables and grounding materials	-	-	4,500	-	-	4,500
3.	Central air-conditioning system for two-storied administrative building - with individual air handling unit for each floor	-	68 TR	76,780	-	70 TR	79,000
4.	Overhead fuel oil storage tank with individual storage tanks for furnaces, pumps, valves, piping and instruments for transfering fuel oil	1	300 kg (450 Lts)	500	2	300 kg	1,000

JOB NO. : DCIL-105

EXHIBIT : 19

Sl. No.	Description	18000 TPA Nos.	18000 TPA Capacity	18000 TPA Price (US$)	36000 TPA Nos.	36000 TPA Capacity	36000 TPA Price (US$)
5.	Illumination, fans and room coolers	-	-	4,000	-	-	5,000
6.	Water pumps for tubewell and overhead tank with valves and other fittings for water distribution and cost of digging 4" dia tubewell -						
	- Pumps	2	120 lpm	400	2	190 lpm	600
	- Overhead Tank	1	12 m^3	4,700	1	20 m^3	6,600
7.	Compressors delivering air at 7 kgf/cm^2 pressure	1	1 m^3	1,700	2	1 m^3	3,400
8.	Furniture, fittings, drawing equipment, file cabinets, phones, office equipment, etc.	-	-	3,000	-	-	3,000
9.	Transport (cars)	4		20,000	4		2,000
		TOTAL		1,27,280			1,45,000

SECTION - 10
SPACE AND LAYOUT

SPACE AND LAYOUT

Requirement of space for various sections in the plant are shown in Exhibit-20. Each section of the plant comprises a number of work centres. The space for each work centre has been arrived at, based on the following requirements :

- o area occupied by equipment
- o working area
- o area for movement of men and materials
- o area for temporary storage of incoming and outgoing materials

Workshop Building

The fabrication workshop, utility centres and other buildings are placed so that they are in close proximity. The layout design showing the relative locations of different shops and buildings for the 18,000 TPA plant may be seen in Exhibit-21, enclosed in a pouch at the end.

While deciding on position of machines in the fabrication shop, care has been taken to ensure unidirectional flow of material. Machines have been located to facilitate easy movement of men, material and handling equipment.

The workshop building is proposed to be of reinforced concrete construction. The columns, roof, floor, etc., shall also be of RCC structure. The design of the building will ensure maximum use of natural light and ventilation. Soundproof glass panes will be provided to aid supervision and control.

Administrative Building

This will be a 2 storeyed building made of RCC brick construction.

Tower Testing Control Room

The control room will need to have a full view of the transverse and longitudinal testing arrangement. Therefore, the side of control room facing the test bed will be covered with soundproof glass. The control room will also have the necessary arrangements for operating and controlling the winches and dynamometres.

Auxiliary Buildings

Auxiliary buildings include toilets and wash rooms, security office, transformer house, pump house, etc., located at appropriate places. These buildings will be constructed with masonry bricks and cement.

Estimated costs of civil work including land development, fencing, drainage, roads and building construction are shown in Exhibit-22.

JOB NO. : DCIL-105 EXHIBIT : 20

UNITED NATIONS INDUSTRIAL DEVELOPMENT ORGANIZATION AND ARAB INDUSTRIAL DEVELOPMENT AND MINING ORGANIZATION

PROJECT PROFILE ON HIGH VOLTAGE AND ULTRA HIGH VOLTAGE TOWERS

SUMMARY OF SPACE REQUIREMENT

Sl. No.	Desription	Land Area (sq m) 18000 TPA	36000 TPA
A.	**Workshop**		
	o Raw Material Store (Stockyard)		
	- Built up Area	480	960
	- Open	2500*	4500*
	o General Store	288	576
	o Despatch	144	288
	o Cutting and Dressing up	576	1152
	o Bending and Straightening	216	432
	o Layout, Template and Identification Marking	180	360
	o Drilling	180	360
	o Acid Pickling and Galvanising	288	576
	o Tool Room	180	180
	o Maintenance Shop	72	144
	o Tool Crib	36	36
	o Machinery Control Centres	36	72
	o Workshop Offices (Double Storied)	180	360
	Sub-total	2856	5496
	o Aisles and Gangways (30% of Sub-total)	857	1649
	Total	3713	7145

JOB NO. : DCIL-105

EXHIBIT : 20

Sl. No.	Desription	Land Area (sq m) 18000 TPA	36000 TPA
B.	**Administrative Building**		
	o Design and Planning	121	131
	o Commercial	126	141
	o Finance and Accounts	186	186
	o Personnel and Administration	350	350
	o Aisles and Staircase	235	242
	Total	1018	1050
	Plinth Area (since double storeyed)	509	525
C.	**Auxiliary Buildings**		
	o Toilets and Wash Rooms in Workshop	72	144
	o Refreshment Centre	72	144
	o Transformer House	54	100
	o Pump House	36	72
	o Security	36	72
	o First-aid Centre	36	72
	o Garage	36	72
	o Car Parking	108	216
	Total	450	892

JOB NO. : DCIL-105 EXHIBIT : 20

Sl. No.	Desription	Land Area (sq m) 18000 TPA	36000 TPA
D.	**Tower Testing Station**		
	o Test Bed and Testing Field (80 m x 40 m)	3200*	3200*
	o Control Room	60	60
	Total	60	60
E.	Total Covered Land Area	4732	8622
F.	Open Land Area for Stockyard and Test Bed	5700	7700
G.	Land Area Required at present (2E + F)	15164	24944
H.	Area for Future Expansion (50% of Workshop Built-up Area)	1856	3572
I.	Total Land Area required in future after expansion	17020	28516

* The open area has not been included in arriving at the workshop built-up area and tower testing station area.

JOB NO. : DCIL-105 EXHIBIT : 22

UNITED NATIONS INDUSTRIAL DEVELOPMENT ORGANIZATION
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PROJECT PROFILE ON HIGH VOLTAGE AND ULTRA HIGH VOLTAGE TOWERS

ESTIMATED COST OF CIVIL WORK

Sl. No.	Description	18000 TPA Area (sq m)	18000 TPA Cost (Million US$) Saudi Arabia	36000 TPA Area (sq m)	36000 TPA Cost (Million US$) Algeria	Egypt	Iraq
1.	Land and Land Development including fencing, drainage and road construction	17020	0.852	28516	2.173	1.578	1.940
2.	Workshop Building having a height of 8 metres from floor to top of crane rail	3713	3.353	7145	9.017	6.552	8.038
3.	Administrative Bldg, 2-storied	509	0.554	525	0.795	0.579	0.709
4.	Auxiliary Buildings comprising workshop offices, toilets and washrooms in workshop, refreshment centres, transformer house, pump house, first-aid centre, security, garage and control room	582	0.634	1096	1.659	1.209	1.480
5.	Tower testing bed with RCC raft over pile foundation	120	0.108	120	0.152	0.110	0.135
	TOTAL		5.501		13.796	10.028	12.302

SECTION - 11
MANPOWER AND ORGANIZATION

MANPOWER AND ORGANISATION

Estimates of manpower requirement have been developed for both the 36,000 tonne and 18,000 tonne plants. The following considerations were taken into account :

- o plant capacity
- o nature and scope of activities involved
- o process and material handling equipment
- o plant layout and proximity to areas of supervision

The organisation will operate for 300 days in a year and will carry out all the activities performed by a manufacturing unit. In order to plan, execute, co-ordinate and control all the necessary activities, manpower is categorised under the following departments :

- o Production
- o Technical
- o Marketing
- o Finance and Accounts
- o Personnel and Administration

The General Manager will head the entire complex, assisted by a Works Manager, a Technical Manager, a Marketing Manager, a Chief Accountant-cum-Company Secretary and a Personnel Manager.

Production

Requirement of workmen in the plant is presented section-wise in Exhibit-23. All sections within the Production Department, excluding the Acid Pickling and Galvanising

Sections will work for 2 shifts. The Acid Pickling and Galvanising Sections will work for 3 shifts; Maintenance Section will work for 2 shifts, and the Tool Room Section will work in the general shift only.

Manpower requirement for the entire Production Department is presented in Exhibit-24.

Technical

The department would be headed by a Technical Manager, who will be assisted by a Design Engineer, a Planning Engineer and a Quality Control Engineer.

Manpower requirement for this department is presented in Exhibit-25.

Marketing

Headed by a Marketing Manager, this department will take care of several functions like sales, purchase and stores. Manpower requirement for this department are indicated in Exhibit-26.

Finance and Accounts

The Chief Accountant-cum-Company Secretary will head this department, with four Accountants reporting to him. This department will work only in the general shift.

Manpower requirement for this department is presented in Exhibit-27.

Personnel and Administration

Exhibit-28 presents the requirement of manpower for this department.

A prototype tower, after it has been erected, is subjected to different types of tests under varying loads. Once the prototype tower passes all the tests, its design is considered as the standard, and other towers are manufactured in accordance with it. However, this type of test is necessary, only when there are specific design requirements. In preparing this report, the manpower requirement has been drawn up without considering personnel required for erection and testing. They may be obtained from the Technical Department, whenever necessary.

A summary of manpower requirements for all departments is presented in Exhibit-29. The 36,000 tonne plants will require 706 personnel each, while the 18,000 tonne plant will require 442 personnel.

Salaries and Wages

Personnel have been grouped into seven levels, for the purpose of salary administration. The statement of monthly salaries and wages is presented in Exhibit-30.

The proposed organisation chart is given in Exhibit-31. The designations, salary levels and number of personnel may be observed from relevant code numbers shown in Exhibits 24 through 28.

JOB NO. : DCIL-105

EXHIBIT : 23

UNITED NATIONS INDUSTRIAL DEVELOPMENT ORGANISATION
AND
ARAB INDUSTRIAL DEVELOPMENT AND MINING ORGANISATION

PROJECT PROFILE ON HIGH VOLTAGE AND ULTRA HIGH VOLTAGE TOWERS

REQUIREMENT OF WORKMEN IN THE PLANT

Sl. No.	Operation	Equipment	18000 TPA					36000 TPA				
			No. of Equipment	No. of Shifts	No. of Workmen			No. of Equipment	No. of Shifts	No. of Workmen		
					Skilled	Unskilled	Total			Skilled	Unskilled	Total
Operation												
1.	Cutting	Universal Cropping Machine	2	2	4	8	12	4	2	8	16	24
		Cold Circular Saw	2	2	4	4	8	4	2	8	8	16
		Notching Machine	1	2	2	2	4	2	2	4	4	8
		Guilloline Shearing Machine	1	2	2	4	6	2	2	4	8	12
		Cross Carriage Profile Cutting Machine	1	2	2	2	4	2	2	4	4	8
		Hand Gas Cutting Set	4	2	8	-	8	4	2	8	-	8
2.	Straightening and Bending	Beam Bending and Straightening Machine	2	2	4	4	8	4	2	8	8	16
		Press Brake	1	2	2	2	4	2	2	4	4	8
		Hydraulic Press	2	2	4	4	8	4	2	8	8	16
		Heating Furnace	1	2	-	2	2	2	2	-	4	4

JOB NO. : DCIL-185

EXHIBIT : 23

Sl. No.	Operation	Equipment	18000 TPA					36000 TPA				
			No. of Equipment	No. of Shifts	No. of Workmen			No. of Equipment	No. of Shifts	No. of Workmen		
					Skilled	Unskilled	Total			Skilled	Unskilled	Total
3.	Heel Chamfering	Shaping Machine	2	2	4	2	6	4	2	8	4	12
4.	Deburring and Smoothening of Cut Edges	Pedestal Grinder	5	2	-	10	10	10	2	-	20	20
		Hand Grinder	3	2	-	6	6	3	2	-	6	6
5.	Marking for Layout and Template Making	Marking Hand Tools	-	2	10	5	15	-	2	10	5	15
6.	Drilling	Pillar Drilling Machine	6	2	12	-	12	12	2	24	-	24
		Radial Drilling Machine	6	2	12	-	12	12	2	24	-	24
7.	Marking for Identification	Marking Press	5	2	10	-	10	10	2	20	-	20
8.	Acid Pickling and Water Rinsing	Acid Pickling Tank	1	3	-	6	6	2	3	-	12	12
		Water Rinsing Tank	1	3	-	6	6	2	3	-	12	12

JOB NO. : DCIL-105

EXHIBIT : 23

Sl. No.	Operation	Equipment	18000 TPA					36000 TPA				
			No. of Equipment	No. of Shifts	No. of Workmen			No. of Equipment	No. of Shifts	No. of Workmen		
					Skilled	Unskilled	Total			Skilled	Unskilled	Total
9.	Hot Dip Galvanising	Galvanising Tank, and Composition and Thickness Testing Instruments	1	3	6	6	12	2	3	12	12	24
		Oil-fired Furnace	1	3	3	-	3	2	3	6	-	6
		Centrifuge	1	1	1	1	2	2	1	2	2	4
	Sub-total				90	74	164			162	137	299
Stores												
1.	Bundling and Packing	Carpentry Tools	2 set	2	2	4	6	4 set	2	4	8	12
2.	Tool Crib Helper		-	2	-	2	2	-	2	-	4	4
3.	Material Handling		-	2	-	6	6	-	2	-	12	12
	Sub-total				2	12	14			4	24	28

JOB NO. : DCIL-105

EXHIBIT : 23

Sl. No.	Operation	Equipment	18000 TPA					36000 TPA				
			No. of Equipment	No. of Shifts	No. of Workmen			No. of Equipment	No. of Shifts	No. of Workmen		
					Skilled	Unskilled	Total			Skilled	Unskilled	Total
Tool Room												
1.	Tool and Die Repair and Fabrication and Machineries of Jigs and Fixtures	Cold Saw Cutter Grinder	1	1	1	-	1	1	1	1	-	1
		Shearing and Cropping Blade Grinder	1	1	1	-	1	1	1	1	-	1
		Drill Point Grinder	1	1	1	-	1	1	1	1	-	1
		Universal Grinder	1	1	1	-	1	1	1	1	-	1
		Precision Column Drilling Machine	1	1	1	-	1	1	1	1	-	1
		Precision Lathe	1	1	1	-	1	1	1	1	-	1
		Universal Milling Machine	1	1	1	-	1	1	1	1	-	1
		Electric Heat Treatment Furnace and Quenching Tank	1	1	1	1	2	1	1	1	1	2
		Welding Transformer	2	1	2	-	2	2	1	2	-	2
2.	Bench Fitting	Bench Grinder Hand Tools	-	1	2	-	2	-	1	2	-	2
3.	Fabrication	Bench Grinder Hand Tools	-	1	1	1	2	-	1	1	1	2

JOB NO. : DCIL-105

EXHIBIT : 23

Sl. No.	Operation	Equipment	18000 TPA					36000 TPA				
			No. of Equipment	No. of Shifts	No. of Workmen			No. of Equipment	No. of Shifts	No. of Workmen		
					Skilled	Unskilled	Total			Skilled	Unskilled	Total
4.	General Help	Bench Grinder Hand Tools	-	2	-	2	2	-	2	-	2	2
	Sub-total				13	4	17			13	4	17
	Material Handling	30T Crane	2	2	4	4	8	4	2	8	8	16
		Gantry Crane	1	3	3	3	6	2	3	6	6	12
		Mobile Crane	1	2	2	2	4	2	2	4	-	4
		Battery Operated Forklift Truck	2	2	4	4	8	4	2	8	8	16
		Truck	2	1 (General)	2	4	6	4	1 (General)	4	8	12
		Hand Push Trolleys	2	2	-	8	8	4	2	-	16	16
		Double Wheel Barrows	2	2	-	4	4	4	2	-	8	8
	Sub-total				15	29	44			30	54	84

JOB NO. : DCIL-185

EXHIBIT : 23

Sl. No.	Operation	Equipment	18000 TPA					36000 TPA				
			No. of Equipment	No. of Shifts	No. of Workmen			No. of Equipment	No. of Shifts	No. of Workmen		
					Skilled	Unskilled	Total			Skilled	Unskilled	Total
Maintenance (General)												
1.	Sweeping, Cleaning and Sanitation		-	2	-	6	6	-	2	-	12	12
2.	Carpentry	Hand Tools	-	1 (General)	1	1	2	-	1 (General)	2	2	4
3.	Plumbing	Hand Tools	-	1 (General)	1	1	2	-	1 (General)	2	2	4
4.	Masonry	Hand Tools	-	1 (General)	1	1	2	-	1 (General)	2	2	4
5.	Electrical	Hand Tools	-	2	2	-	2	-	2	4	-	4
6.	Pump House	Hand Tools	-	2	2	-	2	-	2	4	-	4

JOB NO. : DCIL-105

EXHIBIT : 23

Sl. No.	Operation	Equipment	18000 TPA					36000 TPA				
			No. of Equipment	No. of Shifts	No. of Workmen			No. of Equipment	No. of Shifts	No. of Workmen		
					Skilled	Unskilled	Total			Skilled	Unskilled	Total
Machinery and Equipment												
7.	Mechanical	Hand Tools	-	2	4	4	8	-	2	8	8	16
8.	Electrical	Hand Tools	-	2	3	2	5	-	2	6	4	10
9.	Electrical (Transformer House)	Hand Tools	-	2	2	-	2	-	2	4	-	4
10.	Lubrication	Hand Tools	-	2	2	-	2	-	2	4	-	4
	Sub-total				18	15	33			36	30	66
	Grand Total				138	134	272			245	249	494

JOB NO. : DCIL-105 EXHIBIT : 24

UNITED NATIONS INDUSTRIAL DEVELOPMENT ORGANIZATION AND ARAB INDUSTRIAL DEVELOPMENT AND MINING ORGANIZATION

PROJECT PROFILE ON HIGH VOLTAGE AND ULTRA HIGH VOLTAGE TOWERS

REQUIREMENT OF MANPOWER - PRODUCTION

Sl. No.	Designation	Salary Level	Numbers 18000 TPA	36000 TPA
A1.	Works Manager	2	1	1
A2.	Production Engineer	3	2	2
A3.	Maintenance Engineer	3	1	1
A4.	Foreman	4	17	17
A5.	Technical Assistant	4	1	1
A6.	Assistant Foreman	5	-	17
A7.	Galvaniser	5	7	14
A8.	Assistant Foreman (Maintenance)	5	-	2
A9.	Tool Room Machine Operator	6	11	11
A10.	Bench Fitter	6	2	2
A11.	Tool Room Fabricator	6	1	1
A12.	Machine Operator	6	60	112
A13.	Furnace Operator	6	5	10
A14.	Marker	6	20	30
A15.	Crane Driver	6	8	18
A16.	Lubricator	6	2	4

JOB NO. : DCIL-195 EXHIBIT : 24

Sl. No.	Designation	Salary Level	Numbers 18000 TPA	Numbers 36000 TPA
A17.	Mechanical Fitter	6	4	7
A18.	Pump House Attendant	6	2	4
A19.	Plumber and Mason	6	2	4
A20.	Electrician	6	7	14
A21.	Carpenter	6	1	2
A22.	Forklift Driver	6	4	8
A23.	Material Handler and Helper	7	136	253
	Total		294	535

JOB NO. : DCIL-105 EXHIBIT : 25

UNITED NATIONS INDUSTRIAL DEVELOPMENT ORGANIZATION AND ARAB INDUSTRIAL DEVELOPMENT AND MINING ORGANIZATION

PROJECT PROFILE ON HIGH VOLTAGE AND ULTRA HIGH VOLTAGE TOWERS

REQUIREMENT OF MANPOWER - TECHNICAL

Sl. No.	Designation	Salary Level	Numbers 18000 TPA	Numbers 36000 TPA
B1.	Technical Manager	2	1	1
B2.	Design Engineer	3	1	1
B3.	Quality Control Engineer	3	1	1
B4.	Planning Engineer	3	1	1
B5.	Technical Assistant (Materials)	4	2	3
B6.	Technical Assistant (Process Planning)	4	2	3
B7.	Draftsman	5	4	4
B8.	Inspector	5	10	15
B9.	Steno-Typist	5	2	2
B10.	Ammonia Printing Machine Operator	6	1	1
B11.	Inspection Helper	7	8	8
	Total		33	40

JOB NO. : DCIL-105 EXHIBIT : 26

UNITED NATIONS INDUSTRIAL DEVELOPMENT ORGANIZATION
AND
ARAB INDUSTRIAL DEVELOPMENT AND MINING ORGANIZATION

PROJECT PROFILE ON HIGH VOLTAGE AND ULTRA HIGH VOLTAGE TOWERS

REQUIREMENT OF MANPOWER - MARKETING

Sl. No.	Designation	Salary Level	Numbers 18000 TPA	Numbers 36000 TPA
C1.	Marketing Manager	2	1	1
C2.	Sales Engineer	3	1	1
C3.	Stores Officer	3	1	1
C4.	Purchase Officer	3	1	1
C5.	Technical Assistant	4	2	3
C6.	Store Keeper (General)	4	2	3
C7.	Store Keeper (Material Stockyard)	4	2	3
C8.	Despatch Supervisor	4	1	1
C9.	Purchase Assistant (Local)	4	2	2
C10.	Purchase Assistant (Foreign)	4	2	2
C11.	Stores Clerk	5	4	6
C12.	Steno-Typist	5	2	3
C13.	Truck Driver	6	2	3
C14.	Store Helper	7	18	27
	Total		41	57

JOB NO. : DCIL-105 EXHIBIT : 27

UNITED NATIONS INDUSTRIAL DEVELOPMENT ORGANIZATION AND ARAB INDUSTRIAL DEVELOPMENT AND MINING ORGANIZATION

PROJECT PROFILE ON HIGH VOLTAGE AND ULTRA HIGH VOLTAGE TOWERS

REQUIREMENT OF MANPOWER - FINANCE AND ACCOUNTS

Sl. No.	Designation	Salary Level	Numbers 18000 TPA	Numbers 36000 TPA
D1.	Chief Accountant-cum-Company Secretary	2	1	1
D2.	Accountant (Costing and Budget)	3	1	1
D3.	Accountant (Taxes, Insurance and Imports)	3	1	1
D4.	Accountant (Wages, Salaries and Ledger Keeping)	3	1	1
D5.	Accountant (Receipts and Payments)	3	1	1
D6.	Accounts Assistant	4	7	7
D7.	Cashier	4	1	1
D8.	Time Office Clerk	5	2	2
D9.	Accounts Clerk	5	4	4
D10.	Steno-Typist	5	2	2
	Total		21	21

JOB NO. : DCIL-105 EXHIBIT : 28

UNITED NATIONS INDUSTRIAL DEVELOPMENT ORGANIZATION AND ARAB INDUSTRIAL DEVELOPMENT AND MINING ORGANIZATION

PROJECT PROFILE ON HIGH VOLTAGE AND ULTRA HIGH VOLTAGE TOWERS

REQUIREMENT OF MANPOWER - PERSONNEL AND ADMINISTRATION

Sl. No.	Designation	Salary Level	Numbers 18000 TPA	Numbers 36000 TPA
E1.	Personnel Manager	2	1	1
E2.	Personnel Officer	3	1	1
E3.	Workers' Training Officer	4	1	1
E4.	Welfare Assistant	4	1	1
E5.	Personnel Assistant for Recruitment	4	1	1
E6.	First-aid Centre Incharge	4	1	1
E7.	Security Incharge-cum-House Keeper	4	1	1
E8.	Office Incharge	4	1	1
E9.	Librarian	5	1	1
E10.	Steno-Typist	5	3	3
E11.	Telephone Operator-cum-Receptionist	5	1	1
E12.	Filing Clerk	5	2	2
E13.	Despatch Clerk	5	1	1
E14.	Security Guard	6	3	3
E15.	Car Driver	6	4	4
E16.	Watchman	7	9	9

JOB NO. : DCIL-105 **EXHIBIT : 28**

Sl. No.	Designation	Salary Level	Numbers 18000 TPA	Numbers 36000 TPA
E17.	Office Boy	7	4	4
E18.	Refreshment Vendor	7	2	2
E19.	Sweeper and Gardener	7	12	12
	Total		50	50

JOB NO. : DCIL-105 EXHIBIT : 29

UNITED NATIONS INDUSTRIAL DEVELOPMENT ORGANIZATION AND ARAB INDUSTRIAL DEVELOPMENT AND MINING ORGANIZATION

PROJECT PROFILE ON HIGH VOLTAGE AND ULTRA HIGH VOLTAGE TOWERS

SUMMARY OF MANPOWER REQUIREMENT

Sl. No.	Designation/Department	Numbers 18000 TPA	36000 TPA
1.	General Manager	1	1
2.	Works Manager	1	1
3.	Technical Manager	1	1
4.	Marketing Manager	1	1
5.	Chief Accountant-cum-Company Secretary	1	1
6.	Personnel Manager	1	1
7.	Production	293	534
8.	Technical	32	39
9.	Marketing	40	56
10.	Finance and Accounts	20	20
11.	Personnel and Administration	49	49
12.	Secretary to General Manager	1	1
13.	Steno-Typist to General Manager	1	1
	Total	442	706

JOB NO. : DCIL-105 EXHIBIT : 30

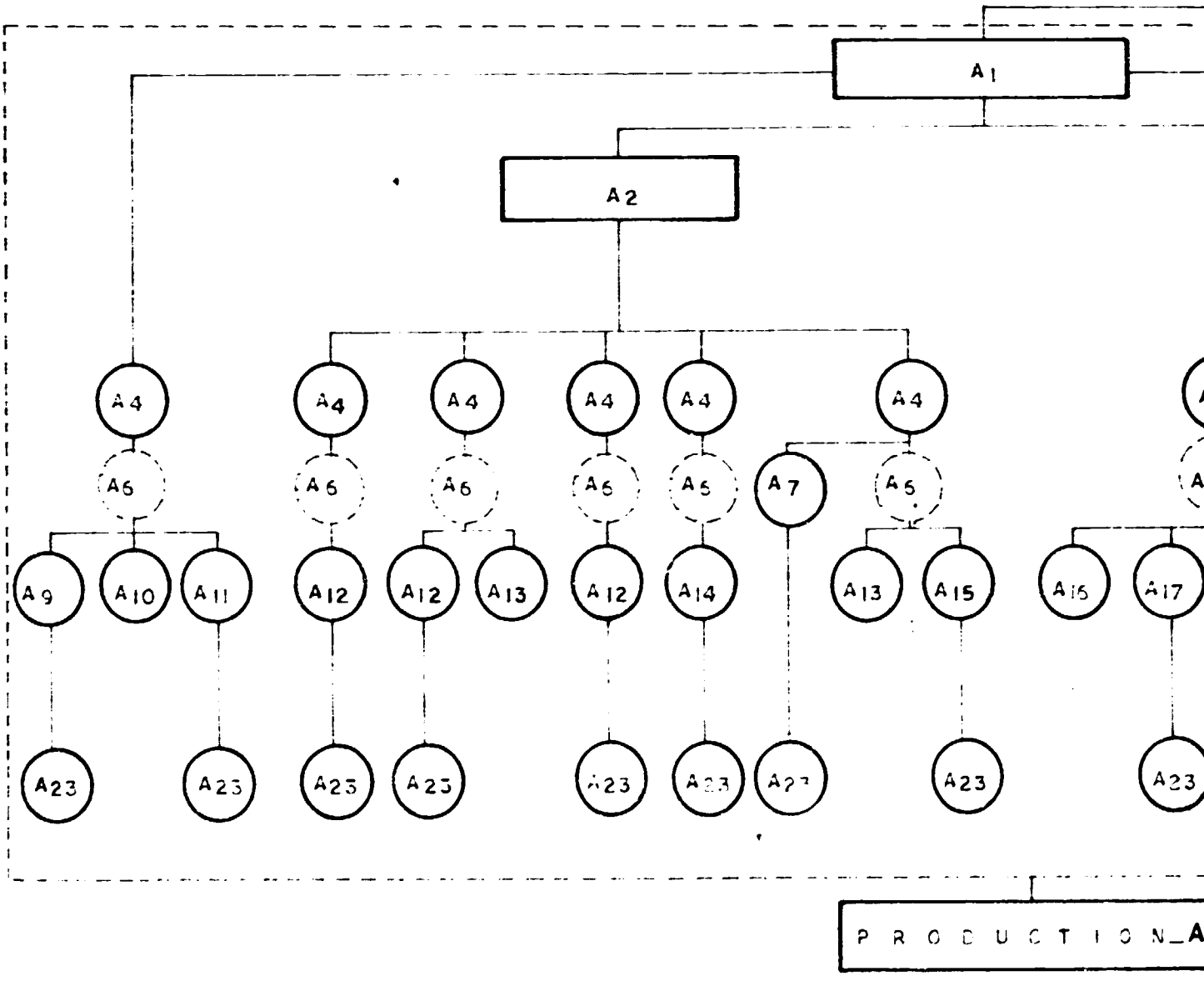
UNITED NATIONS INDUSTRIAL DEVELOPMENT ORGANIZATION
AND
ARAB INDUSTRIAL DEVELOPMENT AND MINING ORGANIZATION

PROJECT PROFILE ON HIGH VOLTAGE AND ULTRA HIGH VOLTAGE TOWERS

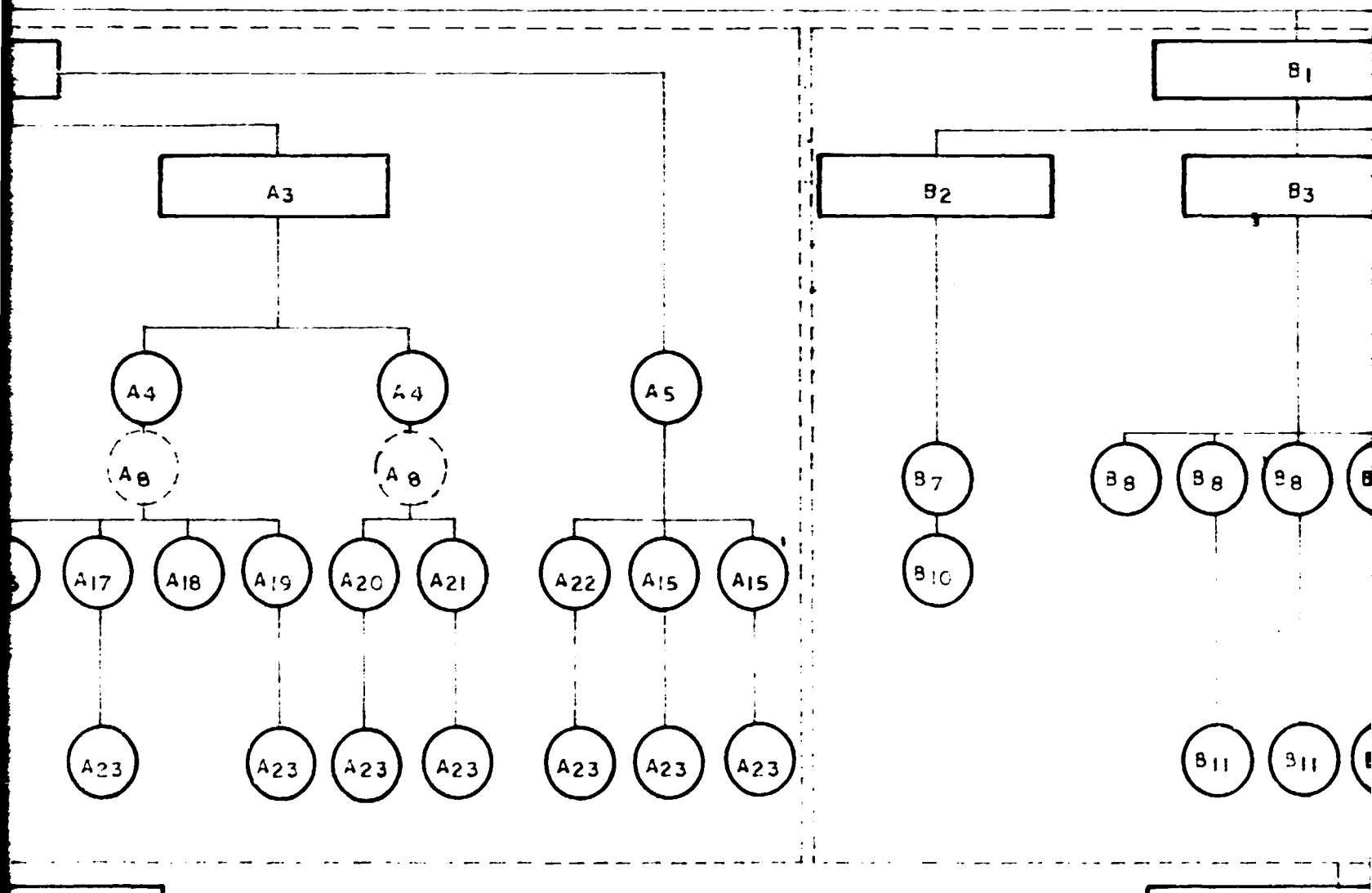
STATEMENT OF MONTHLY SALARIES AND WAGES

Salary Level	Numbers		Basic Monthly Salary (US$)				Total per Month (US$)			
	18000 TPA	36000 TPA	Saudi Arabia	Algeria	Egypt	Iraq	Saudi Arabia	Algeria	Egypt	Iraq
1	1	1	9000	9000	9000	9000	9000	9000	9000	9000
2	5	5	6500	6500	4000	6000	32500	32500	20000	30000
3	14	14	3320	3740	1146	4823	46480	52360	16044	67522
4	48	53	1480	2711	859	3215	71040	143683	45527	170395
5	46	80	1200	2100	687	1607	55200	168000	54960	128560
6	139	238	900	1500	400	900	125100	357000	95200	214200
7	189	315	580	981	229	482	109620	309015	72135	151830
TOTAL	442	706	-	-	-	-	448940	1071558	312866	771507

JOB NO. : DCIL-105



SECTION 1



I O N_A

T E C H N I C

SECTION 2

FOR 36000 TPA PLANT ONLY

☆ SECRETARY TO GENERAL MA

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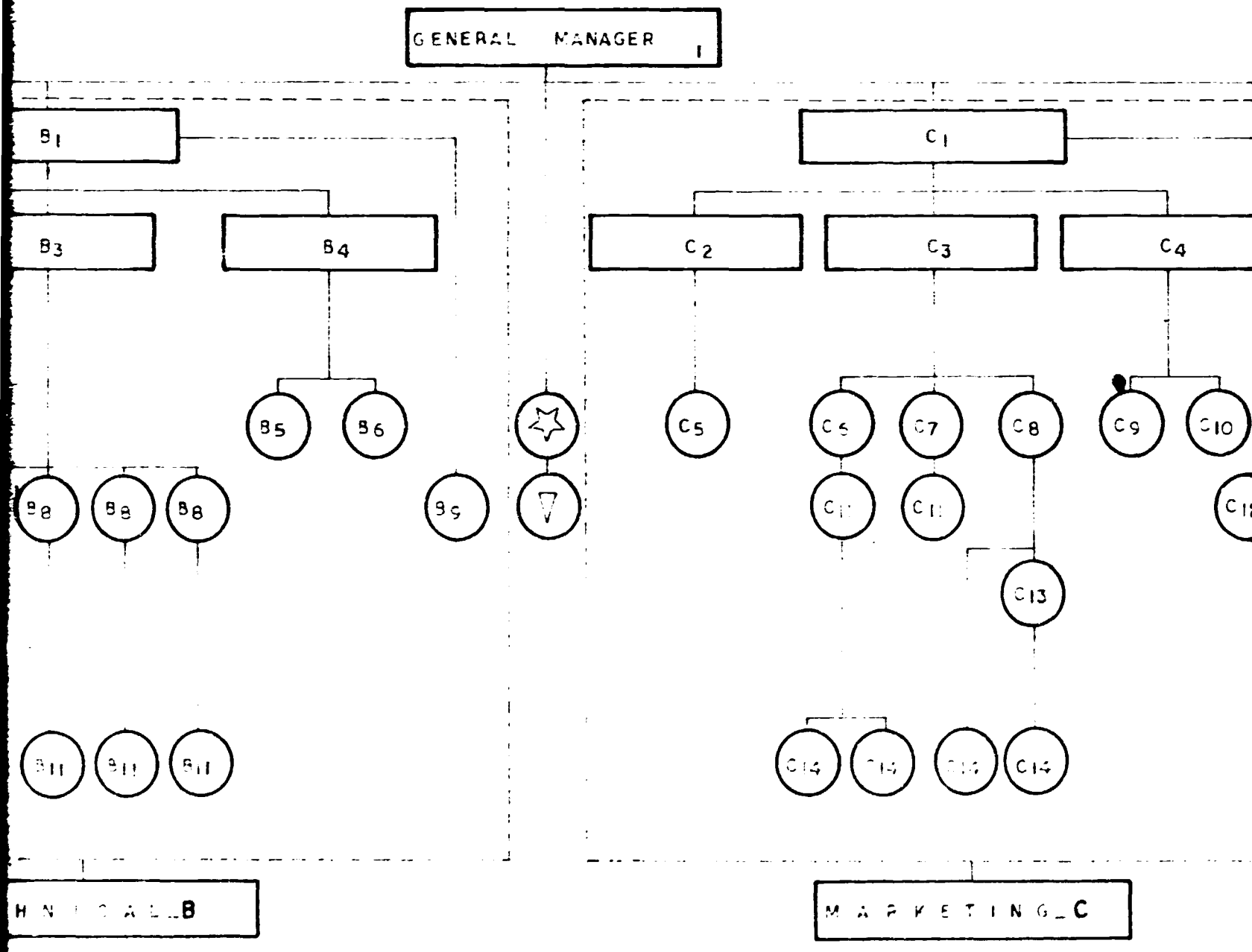
N AND ARAB INDUSTRIAL DEVELOPMENT AND MINING ORGANIZATION

GH VOLTAGE AND ULTRA HIGH VOLTAGE TOWERS

ORGANISATION CHART

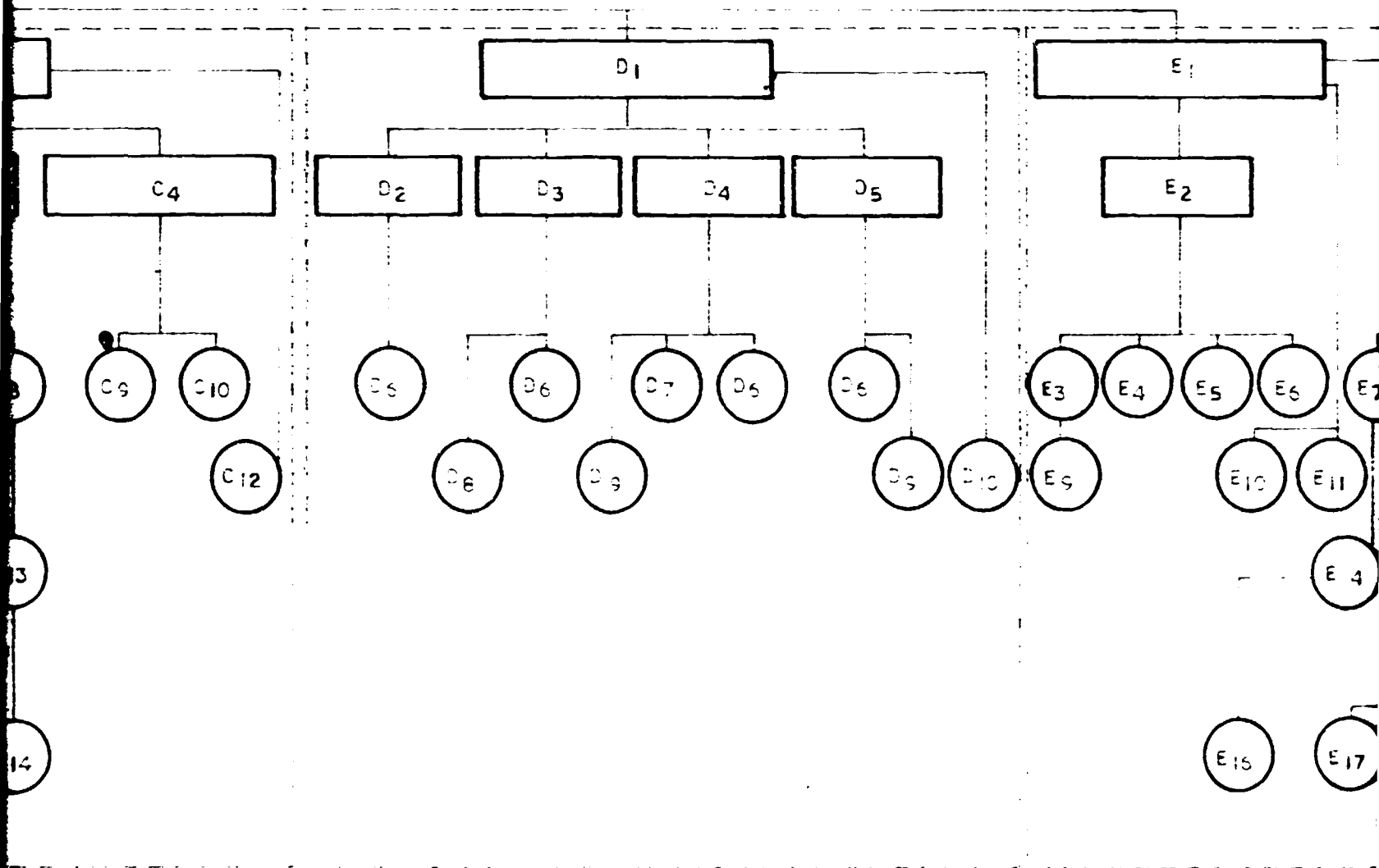


ENERAL MANAGER

SECTION 3

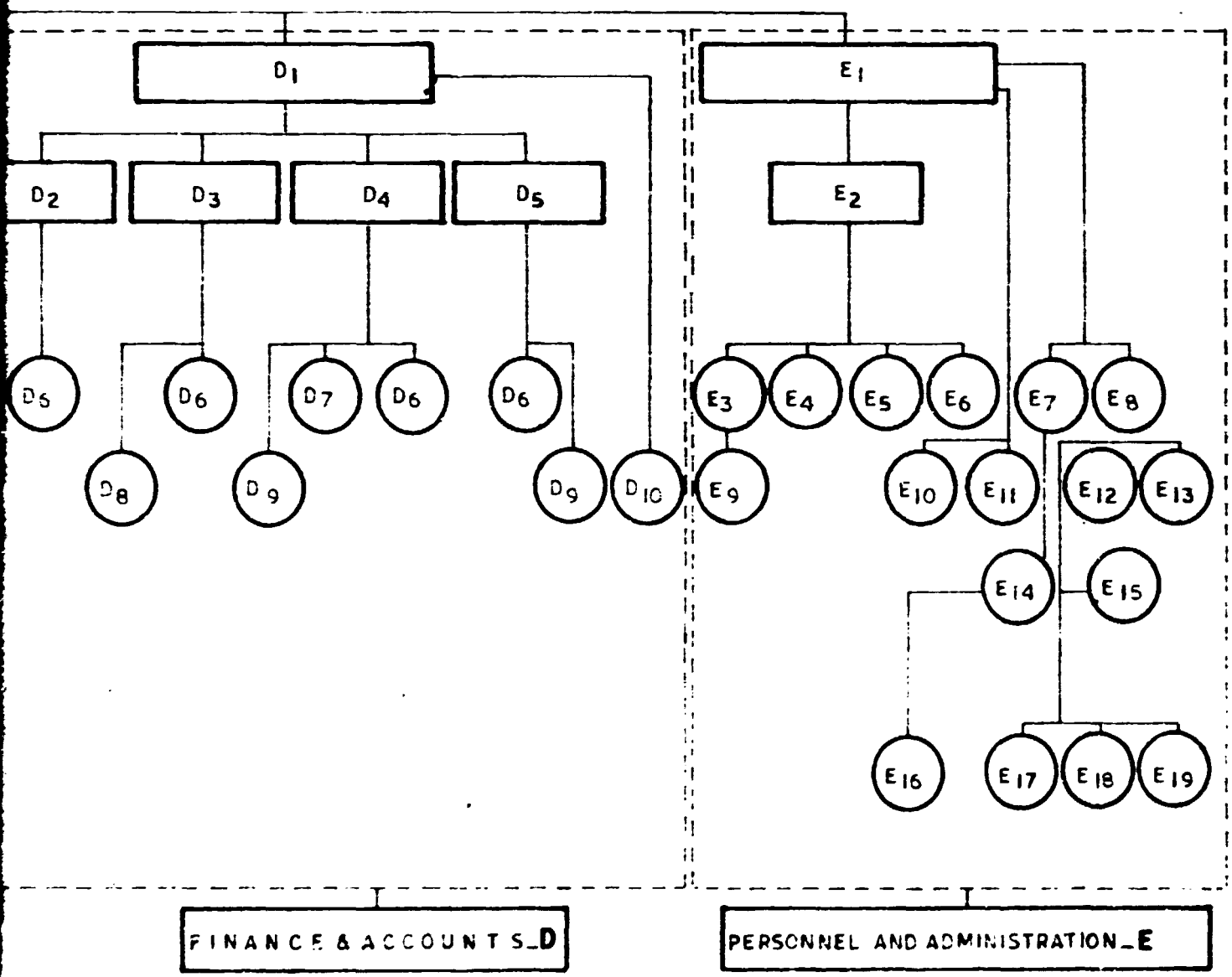
GENERAL MANAGER

EXHIB



SECTION 4

EXHIBIT : 31



SECTION 5

SECTION - 12
FINANCIAL ANALYSIS AND EVALUATION

DEVELOPMENT
CONSULTANTS

PLANT LOCATION : ALGERIA

FINANCIAL ANALYSIS AND EVALUATION

The financial implications of the proposed projects are presented in this Section.

It may be mentioned here, that for the sake of uniformity, the prices of plant and equipment and raw materials have been considered identical for all the countries, where the plants will be set up. Since most of the plant and equipment and raw materials are to be imported, the prevailing international prices of these items have been taken as the basis of calculation. For other cost parameters, which vary from country to country, the figures, as provided by the client has been considered.

COUNTRY : ALGERIA

The financial analysis and evaluation of the proposed project for setting up of HV and UHV Transmission Line Towers plant in this country are based on the capacity utilisation, price and costs.

Project Cost

The estimated cost of the project of setting up a 36,000 TPA plant is around US $ 23.87 million as can be seen from Exhibit-32. The project cost includes the expenditure towards

- Land and land development
- Building and civil work
- Plant and machinery
- Miscellaneous fixed assets
- Preliminary expenses

- o Pre-operative expenses
- o Technical know-how fees

Preliminary expenses have been assumed on a lumpsum basis on the project cost. Pre-operative expenses have four components, viz., establishment, travelling expenses, overseas training expenses and miscellaneous expenses. Establishment costs have been computed on the basis of salaries payable and overheads to various personnel who have to be recruited at various levels, during the construction period. Travelling expenss have been taken as approximately 10% of establishment costs in various quarters up to the fifth quarter of the construction period while from sixth to ninth quarter it is assumed to be 7.5%. In the last quarter it is taken as 2.5% of the establishment cost. Overseas training expenses and miscellaneous expenses have also been taken on a lumpsum basis. Technical know-how fees have been taken as 3.5% of the project cost excluding interest during construction and margin money for working capital.

5% cushion has been provided towards contingency. This cost also includes interest during construction and margin money for working capital.

Phasing of capital expenditure is based on implementation plan, and interest during construction has been computed based on the phasing. These two are presented in Exhibits 33 and 34 respectively.

Margin money for working capital is presented in Exhibit-35. In computing margin money it is assumed that adequate provisions have to be kept towards storage of raw materials and consumables required to be imported.

The project is assumed to be financed by Debt-Equity Ratio of 1:1.

Production, Sales and Revenue

Statement of production and sales of various product range and the revenue that will be generated from the sales of the products over the 10-year period are presented in Exhibits 36 and 37 respectively. Capacity utilisation is assumed at the rate of 80% in the first year, 90% in the second year and 100% from the third year onwards.

Costs

The annual costs of production and sales computed over 10 years are presented in Exhibit-38. In estimating these costs it is assumed that the salaries and wages will increase at the flat rate of 5% every year.

Profitability

Projected profitability statement is presented in Exhibit-39. The average profit before tax works out to 15.5% of average revenue.

Statement of fixed assets and depreciation under straight line method is presented in Exhibit-40. Tax computation and depreciation for tax are presented in Exhibits 41 and 42 repspectively.

Working capital requirements are shown in Exhibit-43.

Projected cash flow statement and balance sheet over 10-year period are shown in Exhibits 44 and 45 respectively.

The project breaks even at around 73.25% and shows internal rate of return of 34.85% as can be seen from Exhibits 46 and 47 respectively. In computing internal rate of return, outflow is taken as the project cost and inflow is taken as the profit before interest, depreciation and tax.

JOB NO. : DCIL-105 EXHIBIT : 32

UNITED NATIONS INDUSTRIAL DEVELOPMENT ORGANIZATION
AND
ARAB INDUSTRIAL DEVELOPMENT AND MINING ORGANIZATION

PROJECT PROFILE ON HV & EHV TRANSMISSION LINE TOWERS

ESTIMATED PROJECT COST

('000 US $)

Items	Value	Total
1. Land and Land Development (@ US$ 252 per m² for 8622 m²)	2173.00	2173.00
2. Building and Civil Work		
i) Workshop Building (@ US$ 1262 per m² for 7145 m²)	9017.00	
ii) Administrative Building (@ US$ 1514 per m² for 525 m²)	795.00	
iii) Auxiliary Buildings (@ US$ 1514 per m² for 1096 m²)	1659.00	
iv) Tower Testing Station (@ US$ 1262 per m² for 120 m²)	152.00	
Sub-total (2)		11623.00
3. Plant and Machinery		
i) Imported		
- Production equipment	1978.34	
- Tool room equipment	83.54	
- Material handling equipment	497.08	
- Maintenance equipment	6.58	
- Auxiliary equipment and handtools	7.00	
Total F.O.B. Value	2572.54	
ii) Insurance & Freight (@ 10% of FOB Value)	257.25	
iii) C.I.F. Value	2829.79	
iv) Import duty @ 6% on CIF value	169.79	
v) Transportation @ 1% of CIF Value	28.30	
Landed Cost at Site [Sub-total (3)]		3027.88

JOB NO. : DCIL-105 **EXHIBIT : 32**

('000 US $)

	Items	Value	Total
4.	Miscellaneous Fixed Assets		
i)	Transformers	21.90	
ii)	Switchgears	4.50	
iii)	Central Airconditioning system	79.00	
iv)	Overhead Fuel Storage Tank and accessories	1.00	
v)	Illumination,Fans and Room Coolers	5.00	
vi)	Water Pumps and Tank	7.20	
vii)	Compressors	3.40	
viii)	Office Furniture and Equipment	3.00	
ix)	Vehicles	20.00	
	Sub-total (4)		145.00
5.	Preliminary Expenses	25.00	25.00
6.	Pre-operative Expenses		
i)	Establishment	2055.54	
ii)	Travelling Expenses	104.00	
iii)	Training Expenses	70.00	
iv)	Miscellaneous	45.00	
	Sub-total (6)		2274.54
7.	Technical Know-how Fees	735.00	735.00
8.	Sub-total (1 thru 7)	-	20003.41
9.	Contingency @ 5% on above	-	1000.17
10.	Sub-total (8 & 9)	-	21003.58
11.	Interest during Construction	-	1695.59
12.	Margin Money for Working Capital	-	1171.57
	TOTAL COST	-	23870.74

JOB NO. : DCIL-105

EXHIBIT : 33

UNITED NATIONS INDUSTRIAL DEVELOPMENT ORGANIZATION
AND
ARAB INDUSTRIAL DEVELOPMENT AND MINING ORGANIZATION

PROJECT PROFILE ON HV & EHV TRANSMISSION LINE TOWERS

PHASING OF CAPITAL EXPENDITURE

('000 US $)

	Total	Construction Period in Quarters									
		1	2	3	4	5	6	7	8	9	10
1. Land and Land Development	2173.00	0.00	434.60	869.20	869.20	0.00	0.00	0.00	0.00	0.00	0.00
2. Building and Civil Work	11623.00										
i) Workshop Building	9017.00	0.00	0.00	0.00	1803.40	1803.40	1803.40	1803.40	1803.40	0.00	0.00
ii) Administrative Building	795.00	0.00	0.00	0.00	318.00	318.00	159.00	0.00	0.00	0.00	0.00
iii) Auxiliary Buildings	1659.00	0.00	0.00	0.00	0.00	0.00	553.00	553.00	553.00	0.00	0.00
iv) Tower Testing Station	152.00	0.00	0.00	0.00	0.00	0.00	76.00	76.00	0.00	0.00	0.00
3. Plant and Machinery	3027.88										
i) Ordering	605.58	0.00	0.00	0.00	605.58	0.00	0.00	0.00	0.00	0.00	0.00
ii) Supply, delivery at site and Installation	2422.30	0.00	0.00	0.00	0.00	0.00	0.00	0.00	2358.72	36.33	27.25

JOB NO. : DCIL-105

EXHIBIT : 33

('000 RS $)

	Total	Construction Period in Quarters									
		1	2	3	4	5	6	7	8	9	10
4. Miscellaneous Fixed Assets	145.00										
i) Transformers	21.90	0.00	0.00	0.00	4.38	0.00	0.00	0.00	17.52	0.00	0.00
ii) Switchgears	4.50	0.00	0.00	0.00	0.90	0.00	0.00	0.00	3.60	0.00	0.00
iii) Central Airconditioning system	79.00	0.00	0.00	0.00	15.80	0.00	0.00	0.00	63.20	0.00	0.00
iv) Overhead Fuel Storage Tank	1.00	0.00	0.00	0.00	0.00	0.50	0.50	0.00	0.00	0.00	0.00
v) and accessories											
vi) Illumination,Fans and Room Coolers	5.00	0.50	0.00	0.90	0.90	0.90	0.90	0.90	0.00	0.00	0.00
vii) Water Pumps and Tank	7.20	0.00	0.00	0.00	1.60	3.60	0.00	0.00	0.00	0.00	0.00
viii) Compressors	3.40	0.00	0.00	0.00	0.68	0.00	0.00	0.00	2.72	0.00	0.00
ix) Office Furniture and Equipment	3.00	0.06	0.00	0.30	0.66	0.66	0.66	0.66	0.00	0.00	0.00
x) Vehicles	20.00	0.00	10.00	0.00	0.00	0.00	5.00	0.00	0.00	5.00	0.00
5. Preliminary Expenses	25.00	12.50	12.50	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
6. Pre-operative Expenses	2274.54										
i) Establishment	2055.54	0.00	28.10	70.80	102.90	102.90	145.56	145.56	145.56	145.56	1168.60
ii) Travelling Expenses	104.00	0.00	3.00	7.00	10.00	10.00	11.00	11.00	11.00	11.00	30.00
iii) Overseas Training Expenses	70.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	10.00	10.00	50.00
iv) Miscellaneous	45.00	0.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00
7. Technical Know-how Fees	735.00	36.75	147.00	147.00	73.50	73.50	73.50	73.50	73.50	36.75	0.00
8. Sub-total (1 thru 7)	20003.41	49.81	640.20	1100.20	2314.59	2318.40	2833.52	2669.02	5047.22	249.64	1200.85
9. Contingency @ 5% on above	1000.17	2.49	32.01	55.01	115.72	115.92	141.68	133.45	252.36	12.48	64.04
10. Total (8 & 9)	21003.58	52.30	672.21	1155.21	2430.32	2434.38	2975.20	2802.47	5299.58	262.13	1264.89

JOB NO. : DCIL-105

EXHIBIT : 34

UNITED NATIONS INDUSTRIAL DEVELOPMENT ORGANISATION
AND
ARAB INDUSTRIAL DEVELOPMENT AND MINING ORGANIZATION

PROJECT PROFILE ON HV & EHV TRANSMISSION LINE TOWERS

ESTIMATION OF INTEREST DURING CONSTRUCTION

('000 US $)

	Construction Period in Quarters										Total
	1	2	3	4	5	6	7	8	9	10	
Capital Expenditure	52.30	672.21	1155.21	4005.22	2434.38	2975.20	2802.47	5299.58	262.13	1344.89	21003.59
Margin Money	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1171.57	1171.57
Total	52.30	672.21	1155.21	4005.22	2434.38	2975.20	2802.47	5299.58	262.13	2516.46	22175.16
Equity	26.38	339.54	589.16	2037.14	1280.78	1576.18	1516.87	2803.23	311.75	1454.37	11935.36
Loan	26.38	339.53	589.16	2037.15	1280.75	1576.17	1516.87	2803.22	311.76	1454.37	11935.36
Total	52.76	679.07	1178.32	4074.29	2561.51	3152.33	3033.74	5606.45	623.51	2908.74	23870.72

JOB NO. : DCIL-105

EXHIBIT : 34

	Construction Period in Quarters										Total
	1	2	3	4	5	6	7	8	9	10	
Interest on loan											
- @ 14% p.a.	0.46	5.94	10.31	35.65	22.41	27.58	26.55	49.06	5.46	25.45	208.87
		0.92	11.88	20.62	71.30	44.83	55.17	53.09	98.11	10.91	366.83
			0.92	11.88	20.62	71.30	44.83	55.17	53.09	98.11	355.92
				0.92	11.88	20.62	71.30	44.83	55.17	53.09	257.81
					0.92	11.88	20.62	71.30	44.83	55.17	204.72
						0.92	11.88	20.62	71.30	44.83	149.55
							0.92	11.88	20.62	71.30	104.72
								0.92	11.88	20.62	33.42
									0.92	11.88	12.80
										0.92	0.92
Total	0.46	6.86	23.11	69.07	127.13	177.13	231.27	306.87	361.38	392.28	1695.56
Debt/Equity	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

MEANS OF FINANCING :	EQUITY	11935.36
	LOAN	11935.36
	TOTAL	23870.72

DEVELOPMENT CONSULTANTS

JOB NO. : DCIL-105 EXHIBIT : 35

UNITED NATIONS INDUSTRIAL DEVELOPMENT ORGANIZATION
AND
ARAB INDUSTRIAL DEVELOPMENT AND MINING ORGANIZATION

PROJECT PROFILE ON HV & EHV TRANSMISSION LINE TOWERS

MARGIN MONEY FOR WORKING CAPITAL

('000 US $)

Sl. No.	Item	Period (Days)	Cost	Bank Finance Available (%)	Bank Finance Available (Amount)	Margin Money
1.	Raw materials & Consumables	120	3965.25	100%	3965.25	0.00
2.	Finished Stock	30	2003.86	100%	2003.86	0.00
3.	Sundry Debtors	30	2517.04	100%	2517.04	0.00
	Sub-total		8486.15		8486.15	0.00
4.	Expenses	30	1171.57	0%	0.00	1171.57
	Total		9657.72		8486.15	1171.57

JOB NO. : DCIL-105

EXHIBIT : 36

UNITED NATIONS INDUSTRIAL DEVELOPMENT ORGANISATION
AND
ARAB INDUSTRIAL DEVELOPMENT AND MINING ORGANISATION

PROJECT PROFILE ON HV & EHV TRANSMISSION LINE TOWERS

STATEMENT OF PRODUCTION & SALES

(in MT)

		OPERATING YEARS									
		1	2	3	4	5	6	7	8	9	10
Capacity	(MT)	36000	36000	36000	36000	36000	36000	36000	36000	36000	36000
Utilisation	(%)	80%	90%	100%	100%	100%	100%	100%	100%	100%	100%
Annual Output	(MT)	28800	32400	36000	36000	36000	36000	36000	36000	36000	36000
Working Days/Year	(No.)	300	300	300	300	300	300	300	300	300	300
Output/Day	(MT)	96	108	120	120	120	120	120	120	120	120
Opening Stock		0	2400	2700	3000	3000	3000	3000	3000	3000	3000
Production		28800	32400	36000	36000	36000	36000	36000	36000	36000	36000
Total		28800	34800	38700	39000	39000	39000	39000	39000	39000	39000
Closing Stock		2400	2700	3000	3000	3000	3000	3000	3000	3000	3000
Sales		26400	32100	35700	36000	36000	36000	36000	36000	36000	36000

JOB NO. : DCIL-105

EXHIBIT : 37

UNITED NATIONS INDUSTRIAL DEVELOPMENT ORGANISATION
AND
ARAB INDUSTRIAL DEVELOPMENT AND MINING ORGANISATION

PROJECT PROFILE ON HV & EHV TRANSMISSION LINE TOWERS

STATEMENT OF REVENUE

('000 US $)

	Average Selling Price (US $/MT)	OPERATING YEARS									
		1	2	3	4	5	6	7	8	9	10
HV & UHV TOWERS	1160.00	30624.00	37236.00	41412.00	41760.00	41760.00	41760.00	41760.00	41760.00	41760.00	41760.00
Total		30624.00	37236.00	41412.00	41760.00	41760.00	41760.00	41760.00	41760.00	41760.00	41760.00

JOB NO. : DCIL-105 EXHIBIT : 38

UNITED NATIONS INDUSTRIAL DEVELOPMENT ORGANISATION
AND
ARAB INDUSTRIAL DEVELOPMENT AND MINING ORGANISATION

PROJECT PROFILE ON HV & EHV TRANSMISSION LINE TOWERS

COST OF PRODUCTION AND SALES

('000 US $)

	OPERATING YEARS									
	1	2	3	4	5	6	7	8	9	10
A. Variable Cost										
Raw Materials and Consumables	11486.64	12922.47	14358.30	14358.30	14358.30	14358.30	14358.30	14358.30	14358.30	14358.30
Fuel	0.67	0.75	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83
Power	70.49	79.28	88.07	88.07	88.07	88.07	88.07	88.07	88.07	88.07
Water	4.94	5.56	6.18	6.18	6.18	6.18	6.18	6.18	6.18	6.18
Sub-total	11562.74	13008.06	14453.38	14453.38	14453.38	14453.38	14453.38	14453.38	14453.38	14453.38
Contingency (@ 5% on above)	578.14	650.40	722.67	722.67	722.67	722.67	722.67	722.67	722.67	722.67
Total 'A'	12140.88	13658.46	15176.05	15176.05	15176.05	15176.05	15176.05	15176.05	15176.05	15176.05
B. Fixed Cost										
1) Labour & Plant Overhead *										
a) Direct labour	4284.00	4498.20	4712.40	4926.60	5140.80	5355.00	5569.20	5783.40	5997.60	6211.80
b) Indirect labour	3708.00	3893.40	4078.80	4264.20	4449.60	4635.00	4820.40	5005.80	5191.20	5376.60
c) Supervision	3740.00	3927.00	4114.00	4301.00	4488.00	4675.00	4862.00	5049.00	5236.00	5423.00
Sub-total	11732.00	12318.60	12905.20	13491.80	14078.40	14665.00	15251.60	15838.20	16424.80	17011.40

JOB NO. : DCIL-105

EXHIBIT : 38

('000 US $)

	OPERATING YEARS									
	1	2	3	4	5	6	7	8	9	10
ii) Other Factory Expenses										
a) Maintenance @ 2.5% on Plant & Equipment	75.70	75.70	75.70	75.70	75.70	75.70	75.70	75.70	75.70	75.70
b) Maintenance @ 1% on Building & Civil Work	116.23	116.23	116.23	116.23	116.23	116.23	116.23	116.23	116.23	116.23
c) Miscellaneous	38.39	38.39	38.39	38.39	38.39	38.39	38.39	38.39	38.39	38.39
Sub-total	230.31	230.31	230.31	230.31	230.31	230.31	230.31	230.31	230.31	230.31
iii) Administrative & Sales Expenses										
a) Salaries *	1126.32	1182.64	1238.95	1295.27	1351.58	1407.90	1464.22	1520.53	1576.85	1633.16
b) Overheads	225.26	236.53	247.79	259.05	270.32	281.58	292.84	304.11	315.37	326.63
Sub-total	1351.58	1419.16	1486.74	1554.32	1621.90	1689.48	1757.06	1824.64	1892.22	1959.80
Total (i+ii+iii)	13313.90	13968.08	14622.25	15276.43	15930.61	16584.78	17238.97	17893.15	18547.33	19201.51
Contingency (@ 5% on above)	665.69	698.40	731.11	763.82	796.53	829.24	861.95	894.66	927.37	960.08
Total 'B'	13979.59	14666.48	15353.37	16040.26	16727.14	17414.03	18100.92	18787.81	19474.70	20161.58
Total Cost of Production & Sales (A+B)	26120.47	28324.94	30529.42	31216.31	31903.20	32590.08	33276.97	33963.86	34650.75	35337.64

* Assumed to increase at the flat rate of 5% straight line every year

JOB NO. : DCIL-105

EXHIBIT : 39

UNITED NATIONS INDUSTRIAL DEVELOPMENT ORGANISATION
AND
ARAB INDUSTRIAL DEVELOPMENT AND MINING ORGANISATION

PROJECT PROFILE ON HV & EHV TRANSMISSION LINE TOWERS

PROJECTED PROFITABILITY STATEMENT

('000 US $)

Elements	OPERATING YEARS									
	1	2	3	4	5	6	7	8	9	10
Raw Materials and Consumables	11486.64	12922.47	14358.30	14358.30	14358.30	14358.30	14358.30	14358.30	14358.30	14358.30
Fuel	0.67	0.75	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83
Power	70.49	79.28	88.07	88.07	88.07	88.07	88.07	88.07	88.07	88.07
Water	4.94	5.56	6.18	6.18	6.18	6.18	6.18	6.18	6.18	6.18
Labour & Plant Overhead	11732.00	12318.60	12905.20	13491.80	14078.40	14665.00	15251.60	15838.20	16424.80	17011.40
Other Factory Expenses	230.31	230.31	230.31	230.31	230.31	230.31	230.31	230.31	230.31	230.31
Administrative & Sales Expenses	1351.58	1419.16	1486.74	1554.32	1621.90	1689.48	1757.06	1824.64	1892.22	1959.80
Sub-total	24876.63	26976.14	29075.64	29729.82	30384.00	31038.18	31692.35	32346.53	33000.71	33654.89
Contingency	1243.83	1348.81	1453.78	1486.49	1519.20	1551.91	1584.62	1617.33	1650.04	1682.74
Total	**26120.47**	**28324.94**	**30529.42**	**31216.31**	**31903.20**	**32590.08**	**33276.97**	**33963.85**	**34650.74**	**35337.64**
Stock Variation	-2003.86	-174.55	-174.56	-50.63	-50.63	-50.62	-50.63	-50.62	-50.63	-50.62
Cost of Production and Sales	24116.61	28150.40	30354.87	31165.68	31852.56	32539.46	33226.35	33913.24	34600.11	35287.01
PROJECTED REVENUE	30624.00	37236.00	41412.00	41760.00	41760.00	41760.00	41760.00	41760.00	41760.00	41760.00
Profit before Interest and Depreciation	6507.39	9085.60	11057.13	10594.32	9907.44	9220.54	8533.65	7846.76	7159.89	6472.99

JOB NO. : DCIL-105

EXHIBIT : 39

('000 US $)

Elements	OPERATING YEARS									
	1	2	3	4	5	6	7	8	9	10
Interest										
On Term Loan - @ 14% p.a.	1670.95	1670.95	1670.95	1432.24	1193.54	954.83	716.12	477.41	238.71	0.00
On Working Capital Loan - @ 16% p.a.	1357.78	1357.78	678.89	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Sub-total	3028.74	3028.74	2349.84	1432.24	1193.54	954.83	716.12	477.41	238.71	0.00
Profit before Depreciation	3478.66	6056.87	8707.28	9162.07	8713.90	8265.71	7817.54	7369.36	6921.18	6472.99
Depreciation and Amortisation	1060.66	1060.66	1060.66	1060.66	1060.66	1060.66	1060.66	1060.66	1060.66	1060.66
Profit before Tax	2417.99	4996.20	7646.62	8101.41	7653.23	7205.05	6756.89	6308.69	5860.51	5412.32
Tax	604.50	1261.95	1936.66	2290.52	2178.48	2066.43	1954.38	1842.34	1730.29	1618.25
Distributable Profit	1813.49	3734.25	5709.96	5810.89	5474.75	5138.62	4802.49	4466.35	4130.22	3794.07
Dividend	0.00	1193.54	1193.54	1491.92	1491.92	1790.31	1790.31	2387.07	2387.07	2983.84
Retained Earnings	1813.49	2540.72	4516.43	4318.97	3982.83	3348.31	3012.19	2079.27	1743.15	810.22
Add Back : Depreciation & Amortisation	1060.66	1060.66	1060.66	1060.66	1060.66	1060.66	1060.66	1060.66	1060.66	1060.66
NET CASH ACCRUAL	2874.16	3601.38	5577.08	5379.63	5043.49	4408.98	4072.85	3139.93	2803.81	1870.90

JOB NO. : DCIL-105 EXHIBIT : 40

UNITED NATIONS INDUSTRIAL DEVELOPMENT ORGANISATION
AND
ARAB INDUSTRIAL DEVELOPMENT AND MINING ORGANISATION

PROJECT PROFILE ON HV & EHV TRANSMISSION LINE TOWERS

STATEMENT OF FIXED ASSETS AND DEPRECIATION UNDER STRAIGHT LINE METHOD

('000 US $)

Sl. No.	Description	Value	Technical Know-how Fees	Sub-Total	Contin-gency	Sub-Total	Interest during Construct	Sub-Total	50% of Pre-op Expenses	Total	Rate (%)	Amount
1.	Land & Land Development	2173.00	0.00	2173.00	0.00	2173.00	0.00	2173.00	0.00	2173.00	0%	0.00
2.	Building & Civil Work	11623.00	577.38	12200.38	785.69	12986.07	1331.99	14318.06	893.60	15211.66	4%	608.47
3.	Plant & Mahinery	3027.88	150.41	3178.29	204.68	3382.97	346.99	3729.96	232.79	3962.75	8%	317.02
4.	Miscellaneous Fixed Assets	145.00	7.20	152.20	9.80	162.00	16.62	178.62	11.15	189.77	10%	18.98
5.	Preliminary Expenses	25.00	0.00	25.00	0.00	25.00	0.00	25.00	0.00	25.00	10%	2.50
6.	Pre-operative Expenses	2274.54	0.00	2274.54	0.00	2274.54	0.00	2274.54	-1137.54	1137.00	10%	113.70
7.	Technical Know-how Fees	735.00	-735.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0%	0.00
	Sub-total	20003.41		20003.41		21003.58		22699.18		22699.18		1060.66
8.	Contingency	1000.17	0.00	1000.17	-1000.17	0.00	0.00	0.00	0.00	0.00		
	Sub-total	21003.58		21003.58		21003.58		22699.18		22699.18		
9.	Interest during Construction	1695.59	0.00	1695.59	0.00	1695.59	-1695.59	0.00	0.00	0.00		
	Total	22699.18		22699.18		22699.18		22699.18		22699.18		

JOB NO. : DCIL-185 EXHIBIT : 41

UNITED NATIONS INDUSTRIAL DEVELOPMENT ORGANISATION
AND
ARAB INDUSTRIAL DEVELOPMENT AND MINING ORGANIZATION

PROJECT PROFILE ON HV & EHV TRANSMISSION LINE TOWERS

TAX COMPUTATION

('000 US $)

	OPERATING YEARS									
	1	2	3	4	5	6	7	8	9	10
Profit before Depreciation	3478.66	6056.87	8707.28	9162.07	8713.90	8265.71	7817.54	7369.36	6921.18	6472.99
Less : Current Depreciation	1060.66	1009.07	960.66	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Balance	2417.99	5047.80	7746.62	9162.07	8713.90	8265.71	7817.54	7369.36	6921.18	6472.99
Less : Unabsorbed Depreciation	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Taxable Income	2417.99	5047.80	7746.62	9162.07	8713.90	8265.71	7817.54	7369.36	6921.18	6472.99
Tax @ 25%	604.50	1261.95	1936.66	2290.52	2178.48	2066.43	1954.38	1842.34	1730.29	1618.25

JOB NO. : DCIL-105 EXHIBIT : 42

UNITED NATIONS INDUSTRIAL DEVELOPMENT ORGANIZATION
AND
ARAB INDUSTRIAL DEVELOPMENT AND MINING ORGANIZATION

PROJECT PROFILE ON HV & EHV TRANSMISSION LINE TOWERS

DEPRECIATION FOR TAX

('000 US $)

	WDV Rate	Building & Civil Work 4%	Plant & Machinery 8%	Misc. Fixed Assets 10%	Amortisation 10%	TOTAL
Value		15211.66	3962.75	189.77	1162.00	
Depreciation Year 1		608.47	317.02	18.98	116.20	1060.66
Balance		14603.19	3645.73	170.79	1045.80	
Depreciation Year 2		584.13	291.66	17.08	116.20	1009.07
Balance		14019.06	3354.07	153.71	929.60	
Depreciation Year 3		560.76	268.33	15.37	116.20	960.66
Balance		13458.30	3085.75	138.34	813.40	
Depreciation Year 4		538.33	246.86	13.83	116.20	915.23
Balance		12919.97	2838.89	124.51	697.20	
Depreciation Year 5		516.80	227.11	12.45	116.20	872.56
Balance		12403.17	2611.78	112.06	581.00	
Depreciation Year 6		496.13	208.94	11.21	116.20	832.47
Balance		11907.04	2402.83	100.85	464.80	
Depreciation Year 7		476.28	192.23	10.09	116.20	794.79
Balance		11430.76	2210.61	90.77	348.60	
Depreciation Year 8		457.23	176.85	9.08	116.20	759.36
Balance		10973.53	2033.76	81.69	232.40	
Depreciation Year 9		438.94	162.70	8.17	116.20	726.01
Balance		10534.59	1871.06	73.52	116.20	
Depreciation Year 10		421.38	149.65	7.35	116.20	694.62
Balance		10113.21	1721.37	66.17	0.00	

WDV : Written Down Value

JOB NO. : DCIL-185 EXHIBIT : 43

UNITED NATIONS INDUSTRIAL DEVELOPMENT ORGANISATION
AND
ARAB INDUSTRIAL DEVELOPMENT AND MINING ORGANISATION

PROJECT PROFILE ON HV & EHV TRANSMISSION LINE TOWERS

WORKING CAPITAL REQUIREMENTS
(Excluding Cash & Bank Balances)

('000 US $)

Items	OPERATING YEAR									
	1	2	3	4	5	6	7	8	9	10
1. Raw materials & Consumables	3965.25	4460.91	4956.56	4956.56	4956.56	4956.56	4956.56	4956.56	4956.56	4956.56
2. Finished Stock	2003.86	2178.40	2352.95	2403.57	2454.20	2504.82	2555.45	2606.07	2656.70	2707.32
3. Sundry Debtors	2517.04	3060.49	3403.73	3432.33	3432.33	3432.33	3432.33	3432.33	3432.33	3432.33
TOTAL	8486.15	9699.80	10713.24	10792.47	10843.09	10893.72	10944.34	10994.96	11045.59	11096.21
Increase/(decrease)	8486.15	1213.65	1013.43	79.22	50.63	50.62	50.63	50.62	50.63	50.62
Stock Variation	2003.86	174.55	174.56	50.62	50.63	50.62	50.63	50.62	50.63	50.62

JOB NO. : DCIL-105 EXHIBIT : 44

UNITED NATIONS INDUSTRIAL DEVELOPMENT ORGANISATION
AND
ARAB INDUSTRIAL DEVELOPMENT AND MINING ORGANISATION

PROJECT PROFILE ON HV & EHV TRANSMISSION LINE TOWERS

PROJECTED CASH FLOW STATEMENT

(000 US $)

	Construction Period	1	2	3	4	5	6	7	8	9	10
A. SOURCES											
Increase in Share Capital	11935.36	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Increase in Term Loan	11935.36	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Increase in Bank Loan	0.00	8486.15	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Profit before Tax with Interest added back	0.00	5446.73	8024.93	9996.47	9533.85	8848.77	8159.87	7471.00	6782.09	6093.21	5404.34
Depreciation	0.00	1060.66	1060.66	1060.66	1060.66	1060.66	1060.66	1060.66	1060.66	1060.66	1060.66
TOTAL 'A'	23870.72	14993.54	9085.59	11057.13	10594.51	9909.43	9220.53	8531.66	7842.75	7153.87	6465.00
B. APPLICATIONS											
Increase in Capital Expenditure	21003.59	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Increase/(Decrease) in Working Capital	0.00	8486.15	1213.65	1013.44	29.22	50.62	50.62	50.63	50.62	50.63	50.62

JOB NO. : DCIL-105 EXHIBIT : 44

('000 US $)

	Construction Period	Y 1	Y 2	Y 3	E 4	E 5	A 6	A 7	A 8	R 9	R 10
Interest											
On Term Loan - @ 14% p.a.	1695.56	1670.95	1670.95	1670.95	1432.24	1193.54	954.83	716.12	477.42	238.71	0.00
On Working Capital Loan - @ 16% p.a.	0.00	1357.78	1357.78	678.89	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total Interest	1695.56	3028.73	3028.73	2349.84	1432.24	1193.54	954.83	716.12	477.42	238.71	0.00
Tax	0.00	604.50	1261.95	1936.66	2290.52	2178.47	2066.42	1954.38	1842.33	1730.29	1618.24
Dividend	0.00	0.00	1193.54	1193.54	1491.92	1491.92	1790.30	1790.30	2387.07	2387.07	2983.84
Repayment of Term Loan	0.00	0.00	0.00	1705.05	1705.05	1705.05	1705.05	1705.05	1705.05	1705.05	0.00
Repayment of Working Capital Loan	0.00	0.00	4243.08	4243.07	0.00	0.00	0.00	0.00	0.00	0.00	0.00
TOTAL 'B'	22699.15	12119.38	10940.95	12441.60	6998.95	6819.01	6567.22	6216.48	6462.49	6111.76	4652.70
Opening Balance	0.00	1171.57	4045.73	2190.37	805.90	4401.26	7689.08	10342.39	12659.56	14043.82	15091.93
Surplus /(Deficit) during the Year (A - B)	1171.57	2874.16	-1855.36	-1384.47	3595.36	3287.82	2653.31	2317.17	1384.27	1048.11	1820.28
Closing Balance	1171.57	4045.73	2190.37	805.90	4401.26	7689.08	10342.39	12659.56	14043.82	15091.93	16912.21

JOB NO. : DCIL-105

EXHIBIT : 45

UNITED NATIONS INDUSTRIAL DEVELOPMENT ORGANISATION
AND
ARAB INDUSTRIAL DEVELOPMENT AND MINING ORGANISATION

PROJECT PROFILE ON HV & EHV TRANSMISSION LINE TOWERS

PROJECTED BALANCE SHEET

('000 US $)

		Y		R		A		R			
		1	2	3	4	5	6	7	8	9	10
	Share Capital	11935.36	11935.36	11935.36	11935.36	11935.36	11935.36	11935.36	11935.36	11935.36	11935.36
Add:	Reserves & Surplus	1813.50	4354.21	8870.64	13189.61	17134.45	20520.77	23532.96	25612.23	27355.37	28165.61
	SHAREHOLRERS' FUND	13748.86	16289.57	20806.00	25124.97	29107.81	32456.13	35468.32	37547.59	39290.73	40100.97
Less:	Intangible Assets	1045.80	929.60	813.40	697.20	581.00	464.80	348.60	232.40	116.20	0.00
	TANGIBLE NET WORTH	12703.06	15359.97	19992.60	24427.77	28526.81	31991.33	35119.72	37315.19	39174.53	40100.97
Add:	Term Loan	11935.36	11935.36	10230.31	8525.26	6820.21	5115.16	3410.11	1705.06	0.00	0.00
	CAPITAL FUND	24638.42	27295.33	30222.91	32953.03	35347.02	37106.49	38529.83	39020.25	39174.53	40100.97
Less:	Net Fixed Assets	20592.69	19648.23	18703.77	17759.31	16814.85	15870.39	14925.94	13981.47	13037.01	12092.55
	NET CURRENT ASSETS	4045.73	7647.10	11519.14	15193.72	18532.17	21236.10	23603.90	25038.79	26137.52	28008.42
A.	CURRENT ASSETS										
	Working Capital	8486.15	9699.80	10713.24	10792.46	10849.69	10894.71	10944.34	10994.96	11045.59	11096.21
	Cash & Bank Balance as per Cash Flow Statement	4045.73	2190.37	805.90	4401.26	7668.08	10342.19	12659.56	14043.82	15091.93	16912.21
	TOTAL 'A'	12531.88	11890.17	11519.14	15193.72	18517.77	21236.10	23603.90	25038.79	26137.52	28008.42

JOB NO. : DCIL-105

EXHIBIT : 45

('000 US $)

	Y									
	1	2	3	4	5	6	7	8	9	10
B. CURRENT LIABILITIESS										
Bank Loan	8486.15	4243.07	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
TOTAL 'B'	8486.15	4243.07	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
NET CURRENT ASSETS (A-B)	4045.73	7647.10	11519.14	15193.72	18532.17	21236.10	23603.90	25038.79	26137.52	28008.42

JOB NO. : DCIL-105 EXHIBIT : 46

UNITED NATIONS INDUSTRIAL DEVELOPMENT ORGANIZATION
AND
ARAB INDUSTRIAL DEVELOPMENT AND MINING ORGANIZATION

PROJECT PROFILE ON HV & EHV TRANSMISSION LINE TOWERS

BREAK-EVEN ANALYSIS

('000 US $)

Sl. No.	Particulars		Amount
1.	Raw Materials and Consumables		14358.30
2.	Fuel		0.83
3.	Power		88.07
4.	Water		6.18
5.	Sub-Total (1 thru 4)		14453.38
6.	Contingency		722.67
7.	VARIABLE COSTS (5 + 6)		15176.05
8.	REVENUE		41760.00
9.	CONTRIBUTION (8 - 7)		26583.95
10.	Labour & Plant Overhead*		14371.70
11.	Other Factory Expenses		230.31
12.	Administrative & Sales Expenses*		1655.69
13.	Sub-Total		16257.70
14.	Contingency		812.89
15.	Sub-Total		17070.59
16.	Interest*		1342.02
17.	Depreciation		1060.66
18.	FIXED COSTS (15+16+17)		19473.27
	BREAK-EVEN SALES	18*8/9	30590.03
	BREAK-EVEN POINT (%)		73.25%
	CASH BREAK-EVEN SALES		28923.86
	CASH BREAK-EVEN (%)		69.26%

* Average over 10 years

DEVELOPMENT CONSULTANTS

JOB NO. : DCIL-105 EXHIBIT : 47

UNITED NATIONS INDUSTRIAL DEVELOPMENT ORGANIZATION
AND
ARAB INDUSTRIAL DEVELOPMENT AND MINING ORGANIZATION

PROJECT PROFILE ON HV & EHV TRANSMISSION LINE TOWERS

INTERNAL RATE OF RETURN

('000 US $)

Year	Outflow	Inflow	Net Inflow
0	-23870.74	0.00	-23870.74
1	0.00	6507.39	6507.39
2	0.00	9085.60	9085.60
3	0.00	11057.13	11057.13
4	0.00	10594.32	10594.32
5	0.00	9907.44	9907.44
6	0.00	9220.54	9220.54
7	0.00	8533.65	8533.65
8	0.00	7846.76	7846.76
9	0.00	7159.89	7159.89
10	0.00	6472.99	6472.99

IRR 34.85%

Inflow = Profit before Interest, Depreciation and Tax

PLANT LOCATION : EGYPT

COUNTRY : EGYPT

The financial analysis and evaluation of the proposed project for setting up of HV and UHV Transmission Line Towers plant in this country are based on the capacity utilisation, price and costs.

Project Cost

The estimated cost of the project of setting up a 36,000 TPA plant is around US $ 17.76 million as can be seen from Exhibit-48. The project cost includes the expenditure towards

- Land and land development
- Building and civil work
- Plant and machinery
- Miscellaneous fixed assets
- Preliminary expenses
- Pre-operative expenses
- Technical know-how fees

Preliminary expenses have been assumed on a lumpsum basis on the project cost. Pre-operative expenses have four components, viz., establishment, travelling expenses, overseas training expenses and miscellaneous expenses. Establishment costs have been computed on the basis of salaries payable and overheads to various personnel who have to be recruited at various levels, during the construction period. Travelling expenss have been taken as approximately 15% of establishment costs in various quarters up to the ninth quarter of the construction period while in the last quarter it is taken as 8% of the establishment cost. Overseas training expenses and miscellaneous expenses have also been taken on a lumpsum basis. Technical know-how fees have been taken as 3.5% of the project cost excluding

interest during construction and margin money for working capital.

5% cushion has been provided towards contingency. This cost also includes interest during construction and margin money for working capital.

Phasing of capital expenditure is based on implementation plan, and interest during construction has been computed based on the phasing. These two are presented in Exhibits 49 and 50 respectively.

Margin money for working capital is presented in Exhibit-51. In computing margin money it is assumed that adequate provisions have to be kept towards storage of raw materials and consumables required to be imported.

The project is assumed to be financed by Debt-Equity Ratio of 1:1.

Production, Sales and Revenue

Statement of production and sales of various product range and the revenue that will be generated from the sales of the products over the 10-year period are presented in Exhibits 52 and 53 respectively. Capacity utilisation is assumed at the rate of 80% in the first year, 90% in the second year and 100% from the third year onwards.

Costs

The annual costs of production and sales computed over 10 years are presented in Exhibit-54. In estimating these costs it is assumed that the salaries and wages will increase at the flat rate of 5% every year.

Profitability

Projected profitability statement is presented in Exhibit-55. The average profit before tax works out to 43% of average revenue.

Statement of fixed assets and depreciation under straight line method is presented in Exhibit-56. Tax computation and depreciation for tax are presented in Exhibits 57 and 58 repspectively.

Working capital requirements are shown in Exhibit-59.

Projected cash flow statement and balance sheet over 10-year period are shown in Exhibits 60 and 61 respectively.

The project breaks even at around 28.43% and shows internal rate of return of 91.30% as can be seen from Exhibits 62 and 63 respectively. In computing internal rate of return, outflow is taken as the project cost and inflow is taken as the profit before interest, depreciation and tax.

JOB NO. : DCIL-105 EXHIBIT : 48

UNITED NATIONS INDUSTRIAL DEVELOPMENT ORGANIZATION
AND
ARAB INDUSTRIAL DEVELOPMENT AND MINING ORGANIZATION

PROJECT PROFILE ON HV & EHV TRANSMISSION LINE TOWERS

ESTIMATED PROJECT COST

('000 US $)

	Items	Value	Total
1.	Land and Land Development (@ US$ 183 per m² for 8622 m²)	1577.83	1577.83
2.	Building and Civil Work		
i)	Workshop Building (@ US$ 917 per m² for 7145 m²)	6551.97	
ii)	Administrative Building (@ US$ 1103 per m² for 525 m²)	579.08	
iii)	Auxiliary Buildings (@ US$ 1103 per m² for 1096 m²)	1208.89	
iv)	Tower Testing Station (@ US$ 917 per m² for 120 m²)	110.04	
	Sub-total (2)		8449.97
3.	Plant and Machinery		
i)	Imported		
	- Production equipment	1978.34	
	- Tool room equipment	83.54	
	- Material handling equipment	497.08	
	- Maintenance equipment	6.58	
	- Auxiliary equipment and handtools	7.00	
	Total F.O.B. Value	2572.54	
ii)	Insurance & Freight (@ 10% of FOB Value)	257.25	
iii)	C.I.F. Value	2829.79	
iv)	Import duty @ 6% on CIF value	169.79	
v)	Transportation @ 1% of CIF Value	28.30	
	Landed Cost at Site [Sub-total (3)]		3027.88

JOB NO. : DCIL-105 **EXHIBIT : 48**

('000 US $)

	Items	Value	Total
4.	Miscellaneous Fixed Assets		
i)	Transformers	21.90	
ii)	Switchgears	4.50	
iii)	Central Airconditioning system	79.00	
iv)	Overhead Fuel Storage Tank and accessories	1.00	
v)	Illumination, Fans and Room Coolers	5.00	
vi)	Water Pumps and Tank	7.20	
vii)	Compressors	3.40	
viii)	Office Furniture and Equipment	3.00	
ix)	Vehicles	20.00	
	Sub-total (4)		145.00
5.	Preliminary Expenses	25.00	25.00
6.	Pre-operative Expenses		
i)	Establishment	951.07	
ii)	Travelling Expenses	104.00	
iii)	Overseas Training Expenses	70.00	
iv)	Miscellaneous	45.00	
	Sub-total (6)		1070.07
6.	Technical Know-how Fees	545.00	545.00
7.	Sub-total (1 thru 5)	-	14840.75
8.	Contingency @ 5% on above	-	742.04
9.	Sub-total (6 & 7)	-	15582.79
10.	Interest during Construction	-	1816.65
11.	Margin Money for Working Capital	-	363.91
	TOTAL COST	-	17763.35

JOB NO. : DCIL-105 EXHIBIT : 49

UNITED NATIONS INDUSTRIAL DEVELOPMENT ORGANISATION
AND
ARAB INDUSTRIAL DEVELOPMENT AND MINING ORGANISATION

PROJECT PROFILE ON HV AND EHV TRANSMISSION LINE TOWERS

PHASING OF CAPITAL EXPENDITURE

('000 US $)

	Total	Construction Period in Quarters									
		1	2	3	4	5	6	7	8	9	10
1. Land and Land Development	1577.83	0.00	315.57	631.13	631.13	0.00	0.00	0.00	0.00	0.00	0.00
2. Building and Civil Work	8449.97										
i) Workshop Building	6551.97	0.00	0.00	0.00	1310.39	1310.39	1310.39	1310.39	1310.41	0.00	0.00
ii) Administrative Building	579.08	0.00	0.00	0.00	231.63	231.63	115.82	0.00	0.00	0.00	0.00
iii) Auxiliary Buildings	1208.89	0.00	0.00	0.00	0.00	0.00	402.96	402.96	402.96	0.00	0.00
iv) Tower Testing Station	110.04	0.00	0.00	0.00	0.00	0.00	55.02	55.02	0.00	0.00	0.00
3. Plant and Machinery	3027.88										
i) Ordering	605.58	0.00	0.00	0.00	605.58	0.00	0.00	0.00	0.00	0.00	0.00
ii) Supply, delivery at site and Installation	2422.30	0.00	0.00	0.00	0.00	0.00	0.00	0.00	2358.72	36.33	27.25

JOB NO. : DCIL-105

EXHIBIT : 49

'000 US $

	Total	Construction Period in Quarters									
		1	2	3	4	5	6	7	8	9	10
4. Miscellaneous Fixed Assets	145.00										
i) Transformers	21.90	0.00	0.00	0.00	4.38	0.00	0.00	0.00	17.52	0.00	0.00
ii) Switchgears	4.50	0.00	0.00	0.00	0.90	0.00	0.00	0.00	3.60	0.00	0.00
iii) Central Airconditioning system	79.00	0.00	0.00	0.00	15.80	0.00	0.00	0.00	63.20	0.00	0.00
iv) Overhead Fuel Storage Tank and accessories	1.00	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00
vi) Illumination,Fans and Room Coolers	5.00	0.50	0.00	0.90	0.90	0.90	0.90	0.90	0.00	0.00	0.00
viii) Water Pumps and Tank	7.20	0.00	0.00	0.00	3.60	3.60	0.00	0.00	0.00	0.00	0.00
viii) Compressors	3.40	0.00	0.00	0.00	0.68				2.72		
ix) Office Furniture and Equipment	3.00	0.06	0.00	0.30	0.60	0.60	0.60	0.60	0.60	0.60	0.00
x) Vehicles	20.00	0.00	10.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
5. Preliminary Expenses	25.00	12.50	12.50	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
6. Pre-operative Expenses	1070.07										
i) Establishment	851.07	0.00	19.79	45.86	91.98	91.98	74.70	74.70	74.70	74.70	302.66
ii) Travelling Expenses	104.00	0.00	3.00	7.00	10.00	10.00	11.00	11.00	11.00	11.00	10.00
iii) Overseas Training Expenses	70.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	10.00	10.00	50.00
iv) Miscellaneous	45.00	0.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00
7. Technical Know-how Fees	545.00	27.25	109.00	109.00	54.50	54.50	54.50	54.50	54.50	27.25	0.00
8. Sub-total (1 thru 7)	14840.75	40.31	474.85	799.19	2937.13	1679.16	2036.45	1815.13	4414.33	169.35	474.90
9. Contingency @ 5% on above	742.04	2.02	23.74	39.96	146.86	83.96	101.82	95.76	215.72	8.46	23.74
10. Total (8 & 9)	15582.79	42.33	498.59	839.15	3084.39	1763.12	2138.27	2010.89	4630.05	177.81	498.64

DEVELOPMENT CONSULTANTS

JOB NO. : DCIL-105

EXHIBIT : 50

UNITED NATIONS INDUSTRIAL DEVELOPMENT ORGANISATION
AND
ARAB INDUSTRIAL DEVELOPMENT AND MINING ORGANISATION

PROJECT PROFILE ON HV AND EHV TRANSMISSION LINE TOWERS

ESTIMATION OF INTREST DURING CONSTRUCTION

('000 BS $)

	Construction Period in Quarters										Total
	1	2	3	4	5	6	7	8	9	10	
Capital Expenditure	42.33	498.59	839.15	3083.99	1763.12	2138.27	2010.89	4530.05	177.74	498.66	15582.79
Margin Money	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	363.91	363.91
Total	42.33	498.59	839.15	3083.99	1763.12	2138.27	2010.89	4530.05	177.74	862.57	15946.70
Equity	21.43	252.92	431.58	1578.63	949.15	1162.60	1126.96	2430.12	287.25	641.04	8881.68
Loan	21.42	252.92	431.58	1578.63	949.16	1162.60	1126.96	2430.11	287.25	641.04	8881.67
Total	42.85	505.84	863.16	3157.26	1898.31	2325.20	2253.92	4860.23	574.50	1282.08	17763.35

JOB NO. : DCIL-105

EXHIBIT : 50

('000 US $)

	Construction Period in Quarters										Total
	1	2	3	4	5	6	7	8	9	10	
Interest on loan											
- @ 14% p.a.	0.52	6.20	10.57	38.68	23.25	28.48	27.61	59.54	7.04	15.71	217.60
		1.05	12.39	21.15	77.35	46.51	56.97	55.22	119.08	14.08	403.80
			1.05	12.39	21.15	77.35	46.51	56.97	55.22	119.08	389.72
				1.05	12.39	21.15	77.35	46.51	56.97	55.22	270.64
					1.05	12.39	21.15	77.35	46.51	56.97	215.42
						1.05	12.39	21.15	77.35	46.51	158.45
							1.05	12.39	21.15	77.35	111.94
								1.05	12.39	21.15	34.59
									1.05	12.39	13.44
										1.05	1.05
Total	0.52	7.25	24.01	73.27	135.19	186.93	243.03	330.18	396.76	419.51	1816.65
Debt/Equity	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

MEANS OF FINANCING :

EQUITY	8881.68
LOAN	8881.67
TOTAL	17763.35

JOB NO. : DCIL-105

EXHIBIT : 51

UNITED NATIONS INDUSTRIAL DEVELOPMENT ORGANIZATION
AND
ARAB INDUSTRIAL DEVELOPMENT AND MINING ORGANIZATION

PROJECT PROFILE ON HV AND EHV TRANSMISSION LINE TOWERS

MARGIN MONEY FOR WORKING CAPITAL

('000 US $)

Item	Period (Days)	Cost	Bank Finance Available (%)	Bank Finance Available (Amount)	Margin Money
1. Raw materials & Consumables	60	1982.63	100%	1982.63	0.00
2. Finished Stock	30	1268.70	100%	1268.70	0.00
3. Sundry Debtors	30	2386.85	100%	2386.85	0.00
Sub-total		5638.18		5638.18	0.00
4. Expenses	30	363.91	0%	0.00	363.91
Total		6002.09		5638.18	363.91

JOB NO. : DCIL-105

EXHIBIT : 52

UNITED NATIONS INDUSTRIAL DEVELOPMENT ORGANISATION
AND
ARAB INDUSTRIAL DEVELOPMENT AND MINING ORGANISATION

PROJECT PROFILE ON HV AND EHV TRANSMISSION LINE TOWERS

STATEMENT OF PRODUCTION AND SALES

(in MT)

		OPERATING YEARS									
		1	2	3	4	5	6	7	8	9	10
Capacity	(MT)	36000	36000	36000	36000	36000	36000	36000	36000	36000	36000
Utilisation	(%)	80%	90%	100%	100%	100%	100%	100%	100%	100%	100%
Annual Output	(MT)	28800	32400	36000	36000	36000	36000	36000	36000	36000	36000
Working Days/Year	(No.)	300	300	300	300	300	300	300	300	300	300
Output/Day		96	108	120	120	120	120	120	120	120	120
Opening Stock		0	2400	2700	3000	3000	3000	3000	3000	3000	3000
Production		28800	32400	36000	36000	36000	36000	36000	36000	36000	36000
Total		28800	34800	38700	39000	39000	39000	39000	39000	39000	39000
Closing Stock		2400	2700	3000	3000	3000	3000	3000	3000	3000	3000
Sales		26400	32100	35700	36000	36000	36000	36000	36000	36000	36000

JOB NO. : DCIL-105

EXHIBIT : 53

UNITED NATIONS INDUSTRIAL DEVELOPMENT ORGANISATION
AND
ARAB INDUSTRIAL DEVELOPMENT AND MINING ORGANISATION

PROJECT PROFILE ON HV AND EHV TRANSMISSION LINE TOWERS

STATEMENT OF REVENUE

('000 US $)

	Average Selling Price (US $/MT)	OPERATING YEARS									
		1	2	3	4	5	6	7	8	9	10
HV & UHV TOWERS	1100.00	29040.00	35310.00	39270.00	39600.00	39600.00	39600.00	39600.00	39600.00	39600.00	39600.00
TOTAL		29040.00	35310.00	39270.00	39600.00	39600.00	39600.00	39600.00	39600.00	39600.00	39600.00

JOB NO. : DCIL-105

EXHIBIT : 54

UNITED NATIONS INDUSTRIAL DEVELOPMENT ORGANISATION
AND
ARAB INDUSTRIAL DEVELOPMENT AND MINING ORGANISATION

PROJECT PROFILE ON HV AND EHV TRANSMISSION LINE TOWERS

COST OF PRODUCTION AND SALES

('000 US $)

	OPERATING YEARS									
	1	2	3	4	5	6	7	8	9	10
A. Variable Cost										
Raw Materials and Consumables	11486.64	12922.47	14358.30	14358.30	14358.30	14358.30	14358.30	14358.30	14358.30	14358.30
Fuel	0.25	0.28	0.32	0.32	0.32	0.32	0.32	0.32	0.32	0.32
Power	99.29	111.61	123.24	123.24	123.24	123.24	123.24	123.24	123.24	123.24
Water	4.94	5.56	6.18	6.18	6.18	6.18	6.18	6.18	6.18	6.18
Sub-total	11591.12	13039.93	14488.03	14488.03	14488.03	14488.03	14488.03	14488.03	14488.03	14488.03
Contingency (@ 5% on above)	579.56	652.00	724.40	724.40	724.40	724.40	724.40	724.40	724.40	724.40
Total 'A'	12170.68	13691.93	15212.43	15212.44	15212.44	15212.44	15212.44	15212.44	15212.44	15212.44
B. Fixed Cost										
1) Labour & Plant Overhead '										
a) Direct labour	1142.40	1199.52	1256.64	1313.76	1370.88	1428.00	1485.12	1542.24	1599.36	1656.48
b) Indirect labour	865.62	908.90	952.18	995.46	1038.74	1082.03	1125.31	1168.59	1211.87	1255.15
c) Supervision	1205.84	1266.14	1326.43	1386.72	1447.01	1507.31	1567.60	1627.89	1688.18	1748.47
Sub-total	3213.86	3374.56	3535.25	3695.94	3856.64	4017.33	4178.02	4338.72	4499.41	4660.10

JOB NO. : DCIL-105

EXHIBIT : 54

('000 US $)

	OPERATING YEARS									
	1	2	3	4	5	6	7	8	9	10
ii) Other Factory Expenses										
a) Maintenance @ 2.5% on Plant & Equipment	75.70	75.70	75.70	75.70	75.70	75.70	75.70	75.70	75.70	75.70
b) Maintenance @ 1% on Building & Civil Work	84.50	84.50	84.50	84.50	84.50	84.50	84.50	84.50	84.50	84.50
c) Miscellaneous	32.04	32.04	32.04	32.04	32.04	32.04	32.04	32.04	32.04	32.04
Sub-total	192.24	192.24	192.24	192.24	192.24	192.24	192.24	192.24	192.24	192.24
iii) Administrative & Sales Expenses										
a) Salaries *	540.53	567.55	594.58	621.61	648.[illegible]	[illegible]	[illegible]	729.71	756.74	783.77
b) Overheads	108.11	113.51	118.92	124.32	129.73	135.13	140.54	145.94	151.35	156.75
Sub-total	648.64	681.06	713.50	745.93	778.36	810.79	843.23	875.65	908.09	940.52
Total (i+ii+iii)	4054.74	4247.85	4440.98	4634.11	4827.23	5020.36	5213.49	5406.[illegible]	5599.72	5792.86
Contingency (@ 5% on above)	202.74	212.39	222.05	231.71	241.36	251.02	260.67	270.33	279.99	289.64
Total 'B'	4257.48	4460.24	4663.03	4865.81	5068.59	5271.38	5474.17	5676.98	5879.72	6082.50
Total cost of Production and Sales (A+B)	16428.16	18152.17	19875.46	20078.25	20281.03	20483.81	20686.60	20889.36	21092.16	21294.94

* Assumed to increase at the flat rate of 5% straight line every year

DEVELOPMENT CONSULTANTS

JOB NO. : DCIL-105 EXHIBIT : 55

UNITED NATIONS INDUSTRIAL DEVELOPMENT ORGANISATION
AND
ARAB INDUSTRIAL DEVELOPMENT AND MINING ORGANISATION

PROJECT PROFILE ON HV AND EHV TRANSMISSION LINE TOWERS

PROJECTED PROFITABILITY STATEMENT

('000 US $)

Elements	OPERATING YEARS									
	1	2	3	4	5	6	7	8	9	10
Raw Materials and Consumables	11486.64	12922.47	14358.30	14358.30	14358.30	14358.30	14358.30	14358.30	14358.30	14358.30
Fuel	0.25	0.28	0.32	0.32	0.32	0.32	0.32	0.32	0.32	0.32
Power	99.29	111.61	123.24	123.24	123.24	123.24	123.24	123.24	123.24	123.24
Water	4.94	5.56	6.18	6.18	6.18	6.18	6.18	6.18	6.18	6.18
Labour & Plant Overhead	3213.86	3374.56	3535.25	3695.94	3856.64	4017.33	4178.02	4338.72	4499.41	4660.10
Other Factory Expenses	192.24	192.24	192.24	192.24	192.24	192.24	192.24	192.24	192.24	192.24
Administrative & Sales Expenses	648.64	681.06	713.50	745.93	778.36	810.79	843.23	875.65	908.09	940.52
Sub-total	15645.86	17287.78	18929.03	19122.15	19315.28	19508.40	19701.53	19894.65	20087.78	20280.90
Contingency	782.29	864.39	946.45	956.11	965.76	975.42	985.08	994.73	1004.39	1014.05
Total	16428.15	18152.17	19875.48	20078.26	20281.04	20483.82	20686.61	20889.38	21092.17	21294.95
Stock Variation	-1268.70	-137.78	-137.79	-13.86	-13.87	-13.87	-13.87	-13.87	-13.86	-13.87
Cost of Production and Sales	15159.45	18014.39	19737.69	20064.40	20267.17	20469.95	20672.74	20875.51	21078.31	21281.08
PROJECTED REVENUE	29040.00	35310.00	39270.00	39600.00	39600.00	39600.00	39600.00	39600.00	39600.00	39600.00
Profit before Interest and Depreciation	13880.55	17295.61	19532.31	19535.60	19332.83	19130.05	18927.26	18724.49	18521.69	18318.92

JOB NO. : DCIL-105

EXHIBIT : 55

('000 RS $)

Elements	OPERATING YEARS 1	2	3	4	5	6	7	8	9	10
Interest										
On Term Loan - @ 14% p.a.	1243.43	1243.43	1243.43	1065.80	888.17	710.53	532.90	355.27	177.63	0.00
On Working Capital Loan - @ 16% p.a.	902.11	902.11	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Sub-total	2145.54	2145.54	1243.43	1065.80	888.17	710.53	532.90	355.27	177.63	0.00
Profit before Depreciation	11735.01	15150.07	18288.88	18469.80	18444.66	18419.52	18394.38	18369.22	18344.06	18318.92
Depreciation and Amortisation	836.92	836.92	836.92	836.92	836.92	836.92	836.92	836.92	836.92	836.92
Profit before Tax	10898.09	14313.15	17451.96	17632.88	17607.74	17582.60	17557.44	17532.30	17507.14	17482.00
Tax	2724.52	3589.56	4384.81	4617.45	4611.17	4604.88	4598.59	4592.30	4586.01	4579.72
Distributable Profit	8173.57	10723.59	13067.15	13015.43	12996.57	12977.72	12958.85	12940.00	12921.13	12902.27
Dividend	888.17	888.17	1332.25	1332.25	1776.34	1776.34	2220.42	2220.42	2664.50	2664.50
Retained Earnings	7285.40	9835.42	11734.90	11683.18	11220.23	11201.38	10738.43	10719.58	10256.63	10237.77
Add Back : Depreciation & Amortisation	836.92	836.92	836.92	836.92	836.92	836.92	836.92	836.92	836.92	836.92
NET CASH ACCRUAL	8122.32	10672.34	12571.82	12520.10	12057.15	12038.30	11575.35	11556.50	11093.55	11074.69

JOB NO. : DCIL-105 EXHIBIT : 56

UNITED NATIONS INDUSTRIAL DEVELOPMENT ORGANISATION
AND
ARAB INDUSTRIAL DEVELOPMENT AND MINING ORGANISATION

PROJECT PROFILE ON HV AND EHV TRANSMISSION LINE TOWERS

STATEMENT OF FIXED ASSETS AND DEPRECIATION UNDER STRAIGHT LINE METHOD

('000 US $)

Sl. No.	Description	Value	Technical Know-how Fees	Sub-Total	Contin-gency	Sub-Total	Interest during Construct	Sub-Total	50% of Pre-op Expenses	Total	Rate %	Amount
1.	Land & Land Development	1577.83	0.00	1577.83	0.00	1577.83	0.00	1577.83	0.00	1577.83	[illegible]	0.00
2.	Building & Civil Work	8449.97	396.22	8846.19	539.47	9385.66	[illegible]	10706.[illegible]	[illegible]	11095.40	4%	444.[illegible]
3.	Plant & Mahinery	3027.88	141.98	3169.86	193.31	3363.17	473.26	3836.43	[illegible]	4975.82	8%	318.07
4.	Miscellaneous Fixed Assets	145.80	6.80	151.80	9.26	161.06	22.66	183.72	6.67	190.39	10%	19.04
5.	Preliminary Expenses	25.00	0.00	25.00	0.00	25.00	0.00	25.00	0.00	25.00	10%	2.50
6.	Pre-operative Expenses	1070.07	0.00	1070.07	0.00	1070.07	0.00	1070.07	-535.07	535.00	10%	53.50
7.	Technical Know-how Fees	545.00	-545.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0%	0.00
	Sub-total	14840.75		14840.75		15582.79		17399.44		17399.44		836.92
8.	Contingency	742.04	0.00	742.04	-742.04	0.00	0.00	0.00	0.00	0.00		
	Sub-total	15582.79		15582.79		15582.79		17399.44		17399.44		
9.	Interest during Construction	1816.65	0.00	1816.65	0.00	1816.65	-1816.65	0.00	0.00	0.00		
	Total	17399.44		17399.44		17399.44		17399.44		17399.44		

JOB NO. : DCIL-105

EXHIBIT : 57

UNITED NATIONS INDUSTRIAL DEVELOPMENT ORGANISATION
AND
ARAB INDUSTRIAL DEVELOPMENT AND MINING ORGANISATION

PROJECT PROFILE ON HV AND EHV TRANSMISSION LINE TOWERS

TAX COMPUTATION

('000 US $)

	OPERATING YEARS									
	1	2	3	4	5	6	7	8	9	10
Profit before Depreciation	11735.00	15150.06	18288.88	18469.80	18444.66	18419.52	18394.36	18369.22	18344.06	18318.92
Less : Current Depreciation	836.92	791.82	749.65	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Balance	10898.08	14358.24	17539.23	18469.80	18444.66	18419.52	18394.36	18369.22	18344.06	18318.92
Less : Unabsorbed Depreciation	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Taxable Income	10898.08	14358.24	17539.23	18469.80	18444.66	18419.52	18394.36	18369.22	18344.06	18318.92
Tax @ 25%	2724.52	3589.56	4384.81	4617.45	4611.17	4604.88	4598.59	4592.30	4586.01	4579.73

JOB NO. : DCIL-105 EXHIBIT : 58

UNITED NATIONS INDUSTRIAL DEVELOPMENT ORGANIZATION
AND
ARAB INDUSTRIAL DEVELOPMENT AND MINING ORGANIZATION

PROJECT PROFILE ON HV AND EHV TRANSMISSION LINE TOWERS

DEPRECIATION FOR TAX

('000 US $)

	WDV Rate	Building & Civil Work 4%	Plant & Machinery 8%	Misc. Fixed Assets 10%	Amortisation 10%	Total
Value		11095.40	3975.82	190.39	560.00	
Depreciation Year 1		443.82	318.07	19.04	56.00	836.92
Balance		10651.59	3657.75	171.35	504.00	
Depreciation Year 2		426.06	292.62	17.13	56.00	791.82
Balance		10225.52	3365.13	154.21	448.00	
Depreciation Year 3		409.02	269.21	15.42	56.00	749.65
Balance		9816.50	3095.92	138.79	392.00	
Depreciation Year 4		392.66	247.67	13.88	56.00	710.21
Balance		9423.84	2848.25	124.91	336.00	
Depreciation Year 5		376.95	227.86	12.49	56.00	673.30
Balance		9046.89	2620.39	112.42	280.00	
Depreciation Year 6		361.88	209.63	11.24	56.00	638.75
Balance		8685.01	2410.76	101.18	224.00	
Depreciation Year 7		347.40	192.86	10.12	56.00	606.38
Balance		8337.61	2217.90	91.06	168.00	
Depreciation Year 8		333.50	177.43	9.11	56.00	576.04
Balance		8004.11	2040.46	81.95	112.00	
Depreciation Year 9		320.16	163.24	8.20	56.00	547.60
Balance		7683.94	1877.23	73.76	56.00	
Depreciation Year 10		307.36	150.18	7.38	56.00	520.91
Balance		7376.59	1727.05	66.38	0.00	

WDV : Written Down Value

JOB NO. : DCIL-105

EXHIBIT : 59

UNITED NATIONS INDUSTRIAL DEVELOPMENT ORGANISATION
AND
ARAB INDUSTRIAL DEVELOPMENT AND MINING ORGANISATION

PROJECT PROFILE ON HV AND EHV TRANSMISSION LINE TOWERS

WORKING CAPITAL REQUIREMENTS
(Excluding Cash and Bank Balances)

('000 US $)

Items	OPERATING YEARS									
	1	2	3	4	5	6	7	8	9	10
1. Raw materials & Consumables	1982.63	2230.45	2478.28	2478.28	2478.28	2478.28	2478.28	2478.28	2478.28	2478.28
2. Finished Stock	1268.70	1406.48	1544.27	1558.13	1572.00	1585.87	1599.74	1613.61	1627.47	1641.34
3. Sundry Debtors	2386.85	2902.19	3227.67	3254.79	3254.79	3254.79	3254.79	3254.79	3254.79	3254.79
TOTAL	5638.18	6539.12	7250.22	7291.20	7305.07	7318.94	7332.81	7346.68	7360.54	7374.41
Increase/(decrease)	5638.18	900.94	711.10	40.98	13.87	13.87	13.87	13.87	13.86	13.87
Stock Variation	1268.70	137.78	137.79	13.86	13.87	13.87	13.87	13.87	13.86	13.87

JOB NO. : DCIL-105

EXHIBIT : 60

UNITED NATIONS INDUSTRIAL DEVELOPMENT ORGANISATION
AND
ARAB INDUSTRIAL DEVELOPMENT AND MINING ORGANISATION

PROJECT PROFILE ON HV AND EHV TRANSMISSION LINE TOWERS

PROJECTED CASH FLOW STATEMENT

('000 US $)

	Construction Period	OPERATING YEARS 1	2	3	4	5	6	7	8	9	10
A. SOURCES											
Increase in Share Capital	8881.68	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Increase in Term Loan	8881.67	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Increase in Bank Loan	0.00	5638.18	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Profit before Tax with Interest added back	0.00	13043.63	16458.69	18695.39	18698.68	18495.91	18293.13	18090.34	17887.57	17684.77	17482.00
Depreciation	0.00	836.92	836.92	836.92	836.92	836.92	836.92	836.92	836.92	836.92	836.92
TOTAL 'A'	17763.35	19518.73	17295.61	19532.31	19535.60	19332.84	19130.05	18927.26	18724.49	18521.69	18318.92
B. APPLICATIONS											
Increase in Capital Expenditure	15582.79	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Increase/(Decrease) in Working Capital	0.00	5638.18	900.94	711.10	40.48	13.87	13.87	13.87	13.87	13.86	13.87

JOB NO. : DCIL-105

EXHIBIT : 60

('000 DS $)

	Construction Period	OPERATING YEARS 1	2	3	4	5	6	7	8	9	10
Interest											
On Term Loan - @ 14% p.a.	1816.65	1243.43	1243.43	1243.43	1065.80	888.17	710.53	532.90	355.27	177.63	0.00
On Working Capital Loan - @ 16% p.a.	0.00	902.11	902.11	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total Interest	1816.65	2145.54	2145.54	1243.43	1065.80	888.17	710.53	532.90	355.27	177.63	0.00
Tax	0.00	2724.52	3589.56	4384.81	4617.45	4611.17	4604.88	4598.59	4592.30	4586.01	4579.73
Dividend	0.00	888.17	888.17	1332.25	1332.25	1776.34	1776.34	2220.42	2220.42	2664.50	2664.50
Repayment of Term Loan	0.00	0.00	0.00	1268.81	1268.81	1268.81	1268.81	1268.81	1268.81	1268.81	0.00
Repayment of Working Capital Loan	0.00	0.00	5638.18	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
TOTAL 'B'	17399.44	11396.41	13162.39	8940.40	8325.29	8558.36	8374.43	8634.59	8450.67	8710.81	7258.10
Opening Balance	0.00	363.91	8486.23	12619.45	23211.36	34421.67	45196.14	55951.76	66244.43	76518.25	86329.13
Surplus/(Deficit) during the Year (A - B)	363.91	8122.32	4133.22	10591.91	11210.31	10774.47	10755.62	10292.67	10273.82	9810.88	11060.82
Closing Balance	363.91	8486.23	12619.45	23211.36	34421.67	45196.14	55951.76	66244.43	76518.25	86329.13	97389.95

JOB NO. : DCIL-105

EXHIBIT : 61

UNITED NATIONS INDUSTRIAL DEVELOPMENT ORGANISATION
AND
ARAB INDUSTRIAL DEVELOPMENT AND MINING ORGANISATION

PROJECT PROFILE ON HV AND EHV TRANSMISSION LINE TOWERS

PROJECTED BALANCE SHEET

(US $ '000)

		OPERATING YEARS									
		1	2	3	4	5	6	7	8	9	10
	Share Capital	8881.68	8881.68	8881.68	8881.68	8881.68	8881.68	8881.68	8881.68	8881.68	8881.68
Add:	Reserves & Surplus	7285.40	17120.82	28855.72	40538.90	51759.13	62960.51	73698.94	84418.52	94675.15	104912.92
	SHAREHOLDERS' FUND	16167.08	26002.50	37737.40	49420.58	60640.81	71842.19	82580.62	93300.20	103556.83	113794.60
Less:	Intangible Assets	504.00	448.00	392.00	336.00	280.00	224.00	168.00	112.00	56.00	0.00
	TANGIBLE NET WORTH	15663.08	25554.50	37345.40	49084.58	60360.81	71618.19	82412.62	93188.20	103500.83	113794.60
Add:	Term Loan	8881.67	8881.67	7612.86	6344.05	5075.24	3806.43	2537.62	1268.81	0.00	0.00
	CAPITAL FUND	24544.75	34436.17	44958.26	55428.63	65436.05	75424.62	84950.24	94457.01	103500.83	113794.60
Less:	Net Fixed Assets	16058.52	15277.60	14496.68	13715.76	12934.84	12153.92	11373.00	10592.08	9811.16	9030.24
	NET CURRENT ASSETS	8486.23	19158.57	30461.58	41712.87	52501.21	63270.70	73577.24	83864.93	93689.67	104764.36
A.	CURENT ASSETS										
	Working Capital	5638.18	6539.12	7250.22	7291.20	7305.07	7318.94	7332.81	7346.68	7360.54	7374.41
	Cash & Bank Balance as per Cash Flow Statement	8486.23	12619.45	23211.36	34421.67	45196.14	55951.76	66244.43	76518.25	86329.13	97389.95
	TOTAL 'A'	14124.41	19158.57	30461.58	41712.87	52501.21	63270.70	73577.24	83864.93	93689.67	104764.36

JOB NO. : DCIL-105

EXHIBIT : 61

(DS $ '000)

	OPERATING YEARS									
	1	2	3	4	5	6	7	8	9	10
B. CURRENT LIABILITIES										
Bank Loan	5638.18	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
TOTAL 'B'	5638.18	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
NET CURRENT ASSETS (A-B)	8486.23	19158.57	30461.58	41712.87	52501.21	63278.70	73577.24	83864.93	93689.67	104764.36

JOB NO. : DCIL-105 EXHIBIT : 62

UNITED NATIONS INDUSTRIAL DEVELOPMENT ORGANIZATION AND ARAB INDUSTRIAL DEVELOPMENT AND MINING ORGANIZATION

PROJECT PROFILE ON HV AND EHV TRANSMISSION LINE TOWERS

BREAK-EVEN ANALYSIS

('000 US $)

Sl. No.	Particulars		Amount
1.	Raw Materials and Consumables		14358.30
2.	Fuel		0.32
3.	Power		123.24
4.	Water		6.18
5.	Sub-total (1 thru 4)		14488.04
6.	Contingency		724.40
7.	VARIABLE COSTS (5 + 6)		15212.44
8.	REVENUE		39600.00
9.	CONTRIBUTION (8 - 7)		24387.56
10.	Labour & Plant Overhead*		3936.98
11.	Other Factory Expenses		192.24
12.	Administrative & Sales Expenses*		794.58
13.	Sub-Total (10 thru 12)		4923.80
14.	Contingency		246.19
15.	Sub-Total (13+14)		5169.99
16.	Interest*		926.48
17.	Depreciation		836.92
18.	FIXED COSTS		6933.39
	BREAK-EVEN SALES	18*8/9	11253.29
	BREAK-EVEN POINT (%)		28.43%
	CASH BREAK-EVEN SALES		9899.32
	CASH BREAK-EVEN (%)		25.00%

* Average over 10 years

DEVELOPMENT CONSULTANTS

JOB NO. : DCIL-105 EXHIBIT : 63

UNITED NATIONS INDUSTRIAL DEVELOPMENT ORGANIZATION
AND
ARAB INDUSTRIAL DEVELOPMENT AND MINING ORGANIZATION

PROJECT PROFILE ON HV AND EHV TRANSMISSION LINE TOWERS

INTERNAL RATE OF RETURN

('000 US $)

Year	Outflow	Inflow	Net Inflow
0	-17763.35	0.00	-17763.35
1	0.00	13880.55	13880.55
2	0.00	17295.61	17295.61
3	0.00	19532.31	19532.31
4	0.00	19535.60	19535.60
5	0.00	19332.83	19332.83
6	0.00	19130.05	19130.05
7	0.00	18927.26	18927.26
8	0.00	18724.49	18724.49
9	0.00	18521.69	18521.69
10	0.00	18318.92	18318.92

IRR 91.30%

Inflow = Profit before interest, Depreciation and tax

DEVELOPMENT
CONSULTANTS

PLANT LOCATION : IRAQ

COUNTRY : IRAQ

The financial analysis and evaluation of the proposed project for setting up of HV and UHV Transmission Line Towers plant in this country are based on the capacity utilisation, price and costs.

Project Cost

The estimated cost of the project of setting up a 36,000 TPA plant is around US $ 20.86 million as can be seen from Exhibit-64. The project cost includes the expenditure towards

- Land and land development
- Building and civil work
- Plant and machinery
- Miscellaneous fixed assets
- Preliminary expenses
- Pre-operative expenses
- Technical know-how fees

Preliminary expenses have been assumed on a lumpsum basis on the project cost. Pre-operative expenses have four components, viz., establishment, travelling expenses, overseas training expenses and miscellaneous expenses. Establishment costs have been computed on the basis of salaries payable and overheads to various personnel who have to be recruited at various levels, during the construction period. Travelling expenss have been taken as approximately 10% of establishment costs in various quarters up to the ninth quarter of the construction period while in the last quarter it is taken as 5% of the establishment cost. Overseas training expenses and miscellaneous expenses have also been taken on a lumpsum basis. Technical know-how fees have been taken as 3.5% of the project cost excluding

interest during construction and margin money for working capital.

5% cushion has been provided towards contingency. This cost also includes interest during construction and margin money for working capital.

Phasing of capital expenditure is based on implementation plan, and interest during construction has been computed based on the phasing. These two are presented in Exhibits 65 and 66 respectively.

Margin money for working capital is presented in Exhibit-67. In computing margin money it is assumed that adequate provisions have to be kept towards storage of raw materials and consumables required to be imported.

The project is assumed to be financed by Debt-Equity Ratio of 1:1.

Production, Sales and Revenue

Statement of production and sales of various product range and the revenue that will be generated from the sales of the products over the 10-year period are presented in Exhibits 68 and 69 respectively. Capacity utilisation is assumed at the rate of 80% in the first year, 90% in the second year and 100% from the third year onwards.

Costs

The annual costs of production and sales computed over 10 years are presented in Exhibit-70. In estimating these costs it is assumed that the salaries and wages will increase at the flat rate of 5% every year.

Profitability

Projected profitability statement is presented in Exhibit-71. The average profit before tax works out to 28% of average revenue.

Statement of fixed assets and depreciation under straight line method is presented in Exhibit-72. Tax computation and depreciation for tax are presented in Exhibits 73 and 74 repspectively.

Working capital requirements are shown in Exhibit-75.

Projected cash flow statement and balance sheet over 10-year period are shown in Exhibits 76 and 77 respectively.

The project breaks even at around 53.88% and shows internal rate of return of 58.47% as can be seen from Exhibits 78 and 79 respectively. In computing internal rate of return, outflow is taken as the project cost and inflow is taken as the profit before interest, depreciation and tax.

JOB NO. : DCIL-105

EXHIBIT : 64

UNITED NATIONS INDUSTRIAL DEVELOPMENT ORGANIZATION
AND
ARAB INDUSTRIAL DEVELOPMENT AND MINING ORGANIZATION

PROJECT PROFILE ON HV AND EHV TRANSMISSION LINE TOWERS

ESTIMATED PROJECT COST

('000 US $)

	Items	Value	Total
1.	Land and Land Development (@ US$ 225 per m² for 8622 m²)	1940.00	1940.00
2.	Building and Civil Work		
i)	Workshop Building (@ US$ 1125 per m² for 7145 m²)	8038.00	
ii)	Administrative Building (@ US$ 1350 per m² for 525 m²)	709.00	
iii)	Auxiliary Buildings (@ US$ 1350 per m² for 1096 m²)	1480.00	
iv)	Tower Testing Station (@ US$ 1125 per m² for 120 m²)	135.00	
	Sub-total (2)		10362.00
3.	Plant and Machinery		
i)	Imported		
	- Production equipment	1978.34	
	- Tool room equipment	83.54	
	- Material handling equipment	497.08	
	- Maintenance equipment	6.58	
	- Auxiliary equipment and handtools	7.00	
	Total F.O.B. Value	2572.54	
ii)	Insurance & Freight (@ 10% of FOB Value)	257.25	
iii)	C.I.F. Value	2829.79	
iv)	Import duty @ 6% on CIF value	169.79	
v)	Transportation @ 1% of CIF Value	28.30	
	Landed Cost at Site [Sub-total (3)]		3027.88

JOB NO. : DCIL-105 **EXHIBIT : 64**

('000 US $)

Items	Value	Total
4. Miscellaneous Fixed Assets		
i) Transformers	21.90	
ii) Switchgears	4.50	
iii) Central Airconditioning system	79.00	
iv) Overhead Fuel Storage Tank and accessories	1.00	
v) Illumination,Fans and Room Coolers	5.00	
vi) Water Pumps and Tank	7.20	
vii) Compressors	3.40	
viii) Office Furniture and Equipment	3.00	
ix) Vehicles	20.00	
Sub-total (4)		145.00
5. Preliminary Expenses	25.00	25.00
6. Pre-operative Expenses		
i) Establishment	1673.02	
ii) Travelling Expenses	130.00	
iii) Miscellaneous	50.00	
		1853.02
7. Technical Know-how Fees	662.00	662.00
8. Sub-total (1 thru 5)	-	18014.90
9. Contingency @ 5% on above	-	900.74
10. Sub-total (6 & 7)	-	18915.64
11. Interest during Construction	-	1081.06
12. Margin Money for Working Capital	-	869.60
TOTAL COST	-	20866.29

JOB NO. : DCIL-105

EXHIBIT : 65

UNITED NATIONS INDUSTRIAL DEVELOPMENT ORGANISATION
AND
ARAB INDUSTRIAL DEVELOPMENT AND MINING ORGANISATION

PROJECT PROFILE ON HV AND EHV TRANSMISSION LINE TOWERS

PHASING OF CAPITAL EXPENDITURE

('000 US $)

	Total	Construction Period in Quarters									
		1	2	3	4	5	6	7	8	9	10
1. Land and Land Development	1940.00	0.00	388.00	776.00	776.00	0.00	0.00	0.00	0.00	0.00	0.00
2. Building and Civil Work	10362.00										
i) Workshop Building	8038.00	0.00	0.00	0.00	1607.60	1607.60	1607.60	1607.60	1607.60	0.00	0.00
ii) Administrative Building	709.00	0.00	0.00	0.00	283.60	283.60	141.80	0.00	0.00	0.00	0.00
iii) Auxiliary Buildings	1480.00	0.00	0.00	0.00	0.00	0.00	493.34	493.33	493.33	0.00	0.00
iv) Tower Testing Station	135.00	0.00	0.00	0.00	0.00	0.00	67.50	67.50	0.00	0.00	0.00
3. Plant and Machinery	3027.88										
i) Ordering	605.58	0.00	0.00	0.00	605.58	0.00	0.00	0.00	0.00	0.00	0.00
ii) Supply, delivery at site and Installation	2422.30	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
		0.00	0.00	0.00	0.00	0.00	0.00	0.00	2358.72	36.33	27.25

JOB NO. : DCIL-105

EXHIBIT : 65

('000 US $)

	Total	Construction Period in Quarters									
		1	2	3	4	5	6	7	8	9	10
4. Miscellaneous Fixed Assets	145.00										
i) Transformers	21.90	0.00	0.00	0.00	4.38	0.00	0.00	0.00	17.52	0.00	0.00
ii) Switchgears	4.50	0.00	0.00	0.00	0.90	0.00	0.00	0.00	3.60	0.00	0.00
iii) Central Airconditioning system	79.00	0.00	0.00	0.00	15.80	0.00	0.00	0.00	63.20	0.00	0.00
iv) Overhead Fuel Storage Tank	1.00	0.00	0.00	0.00	0.00	0.50	0.50	0.00	0.00	0.00	0.00
v) and accessories											
vi) Illumination,Fans and Room Coolers	5.00	0.50	0.00	0.90	0.90	0.90	0.90	0.90	0.00	0.00	0.00
vii) Water Pumps and Tank	7.20	0.00	0.00	0.00	3.60	3.60	0.00	0.00	0.00	0.00	0.00
viii) Compressors	3.40	0.00	0.00	0.00	0.68	0.00	0.00	0.00	2.72	0.00	0.00
ix) Office Furniture and Equipment	3.00	0.06	0.00	0.30	0.66	0.66	0.66	0.66	0.00	0.00	0.00
x) Vehicles	20.00	0.00	10.00	0.00	0.00	0.00	5.00	0.00	0.00	5.00	0.00
5. Preliminary Expenses	25.00	12.50	12.50	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
6. Pre-operative Expenses	1851.02										
i) Establishment	1673.02	0.00	24.71	60.62	88.26	88.26	137.07	137.07	137.07	137.07	862.89
ii) Travelling Expenses	130.00	0.00	3.00	7.00	10.00	10.00	15.00	15.00	15.00	15.00	40.00
iii) Miscellaneous	50.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00
7. Technical Know-how Fees	662.00	33.10	132.40	132.40	66.20	66.20	66.20	66.20	66.20	33.10	0.00
8. Sub-total (1 thru 7)	18014.90	51.16	575.61	982.22	3469.16	2066.32	2540.57	2393.26	4764.96	231.50	935.14
9. Contingency @ 5% on above	900.74	2.56	28.78	49.11	173.46	103.32	127.03	119.66	238.50	11.58	46.76
10. Total (8 & 9)	18915.64	53.72	604.39	1031.33	3642.62	2169.64	2667.60	2512.92	5008.46	243.08	981.90

JOB NO. : DCIL-105

EXHIBIT : 66

UNITED NATIONS INDUSTRIAL DEVELOPMENT ORGANISATION
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ARAB INDUSTRIAL DEVELOPMENT AND MINING ORGANISATION

PROJECT PROFILE ON HV AND EHV TRANSMISSION LINE TOWERS

ESTIMATION OF INTEREST DURING CONSTRUCTION

('000 US $)

	Construction Period in Quarters										Total
	1	2	3	4	5	6	7	8	9	10	
Capital Expenditure	53.72	604.39	1031.33	3642.62	2169.64	2667.60	2512.92	5008.46	243.08	981.89	18915.64
Margin Money	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	869.60	869.60
Total	53.72	604.39	1031.33	3642.62	2169.64	2667.60	2512.92	5008.46	243.08	1851.50	19785.24
Equity	27.03	304.44	523.08	1843.52	1125.58	1390.29	1329.95	2602.30	237.36	1049.61	10433.15
Loan	27.03	304.44	523.08	1843.51	1125.59	1390.29	1329.95	2602.30	237.36	1049.61	10433.15
Total	54.06	608.88	1046.16	3687.03	2251.17	2780.58	2659.90	5204.60	474.72	2099.22	20866.30

JOB NO. : DCIL-105

EXHIBIT : 66

('000 US $)

	Construction Period in Quarters										Total
	1	2	3	4	5	6	7	8	9	10	
Interest on loan											
- @ 10% p.a	0.34	3.81	6.54	23.04	14.07	17.38	16.62	32.53	2.97	13.12	130.42
		0.68	7.61	13.08	46.09	28.14	34.76	33.25	65.06	5.93	234.60
			0.68	7.61	13.08	46.09	28.14	34.76	33.25	65.06	228.67
				0.68	7.61	13.08	46.09	28.14	34.76	33.25	163.61
					0.68	7.61	13.08	46.09	28.14	34.76	130.36
						0.68	7.61	13.08	46.09	28.14	95.60
							0.68	7.61	13.08	46.09	67.46
								0.68	7.61	13.08	21.37
									0.68	7.61	8.29
										0.68	0.68
Total	0.34	4.49	14.83	44.41	81.53	112.98	146.98	196.14	231.64	247.72	1081.06
Debt/Equity	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

MEANS OF FINANCING : EQUITY 10433.15
LOAN 10433.15

TOTAL 20866.30

DEVELOPMENT CONSULTANTS

JOB NO. : DCIL-105 EXHIBIT : 67

UNITED NATIONS INDUSTRIAL DEVELOPMENT ORGANIZATION
AND
ARAB INDUSTRIAL DEVELOPMENT AND MINING ORGANIZATION

PROJECT PROFILE ON HV AND EHV TRANSMISSION LINE TOWERS

MARGIN MONEY FOR WORKING CAPITAL

('000 US $)

Item	Period (Days)	Cost	Bank Finance Available (%)	(Amount)	Margin Money
1. Raw materials & Consumables	120	3965.25	100%	3965.25	0.00
2. Finished Stock	30	1680.00	100%	1680.00	0.00
3. Sundry Debtors	30	2517.04	100%	2517.04	0.00
Sub-total		8162.29		8162.29	0.00
4. Expenses	30	869.60	0%	0.00	869.60
Total		**9031.89**		**8162.29**	**869.60**

JOB NO. : DCIL-165 EXHIBIT : 68

UNITED NATIONS INDUSTRIAL DEVELOPMENT ORGANISATION
AND
ARAB INDUSTRIAL DEVELOPMENT AND MINING ORGANISATION

PROJECT PROFILE ON HV AND EHV TRANSMISSION LINE TOWERS

STATEMENT OF PRODUCTION AND SALES

(in MT)

		OPERATING YEARS									
		1	2	3	4	5	6	7	8	9	10
Capacity	(MT)	36000	36000	36000	36000	36000	36000	36000	36000	36000	36000
Utilisation	(%)	80%	90%	100%	100%	100%	100%	100%	100%	100%	100%
Annual Output	(MT)	28800	32400	36000	36000	36000	36000	36000	36000	36000	36000
Working Days/Year	(No.)	300	300	300	300	300	300	300	300	300	300
Output/Day	(MT)	96	108	120	120	120	120	120	120	120	120
Opening Stock		0	2400	2700	3000	3000	3000	3000	3000	3000	3000
Production		28800	32400	36000	36000	36000	36000	36000	36000	36000	36000
Total		28800	34800	38700	39000	39000	39000	39000	39000	39000	39000
Closing Stock		2400	2700	3000	3000	3000	3000	3000	3000	3000	3000
Sales		26400	32100	35700	36000	36000	36000	36000	36000	36000	36000

DEVELOPMENT CONSULTANTS

JOB NO. : DCIL-105

EXHIBIT : 69

UNITED NATIONS INDUSTRIAL DEVELOPMENT ORGANISATION
AND
ARAB INDUSTRIAL DEVELOPMENT AND MINING ORGANISATION

PROJECT PROFILE ON HV AND EHV TRANSMISSION LINE TOWERS

STATEMENT OF REVENUE

('000 US $)

	Average Selling Price (US $/MT)	OPERATING YEARS									
		1	2	3	4	5	6	7	8	9	10
HV & EHV TOWERS	1160.00	30624.00	37236.00	41412.00	41760.00	41760.00	41760.00	41760.00	41760.00	41760.00	41760.00
TOTAL		30624.00	37236.00	41412.00	41760.00	41760.00	41760.00	41760.00	41760.00	41760.00	41760.00

JOB NO. : DCIL-105 EXHIBIT : 70

UNITED NATIONS INDUSTRIAL DEVELOPMENT ORGANISATION
AND
ARAB INDUSTRIAL DEVELOPMENT AND MINING ORGANISATION

PROJECT PROFILE ON HV AND EHV TRANSMISSION LINE TOWERS

COST OF PRODUCTION AND SALES

('000 US $)

	OPERATING YEARS									
	1	2	3	4	5	6	7	8	9	10
A. Variable Cost										
Raw Materials and Consumables	11486.64	12922.47	14358.30	14358.30	14358.30	14358.30	14358.30	14358.30	14358.30	14358.30
Fuel	0.17	0.19	0.21	0.21	0.21	0.21	0.21	0.21	0.21	0.21
Power	205.93	231.67	257.42	257.42	257.42	257.42	257.42	257.42	257.42	257.42
Water	3.44	3.87	4.30	4.30	4.30	4.30	4.30	4.30	4.30	4.30
Sub-total	11696.18	13158.21	14620.23	14620.23	14620.23	14620.23	14620.23	14620.23	14620.23	14620.23
Contingency (@ 5% on above)	584.81	657.91	731.01	731.01	731.01	731.01	731.01	731.01	731.01	731.01
Total 'A'	12280.99	13816.12	15351.24	15351.24	15351.24	15351.24	15351.24	15351.24	15351.24	15351.24
B. Fixed Cost										
1) Labour & Plant Overhead *										
a) Direct labour	2570.40	2698.92	2827.44	2955.96	3084.48	3213.00	3341.52	3470.04	3598.56	3727.08
b) Indirect labour	1821.96	1913.06	2004.16	2095.25	2186.35	2277.45	2368.55	2459.65	2550.74	2641.84
c) Supervision	3587.46	3766.83	3946.21	4125.58	4304.95	4484.33	4663.70	4843.07	5022.44	5201.82
Sub-total	7979.82	8378.81	8777.80	9176.79	9575.78	9974.78	10373.77	10772.76	11171.75	11570.74

JOB NO. : DCIL-105

EXHIBIT : 70

('000 US $)

	OPERATING YEARS									
	1	2	3	4	5	6	7	8	9	10
ii) Other Factory Expenses										
a) Maintenance @ 2.5% on Plant & Equipment	75.70	75.70	75.70	75.70	75.70	75.70	75.70	75.70	75.70	75.70
b) Maintenance @ 1% on Building & Civil Work	103.62	103.62	103.62	103.62	103.62	103.62	103.62	103.62	103.62	103.62
c) Miscellaneous	35.86	35.86	35.86	35.86	35.86	35.86	35.86	35.86	35.86	35.86
Sub-total	215.18	215.18	215.18	215.18	215.18	215.18	215.18	215.18	215.18	215.18
iii) Administrative & Sales Expenses										
a) Salaries *	1278.26	1342.18	1406.09	1470.00	1533.92	1597.83	1661.74	1725.66	1789.57	1853.48
b) Overheads	255.65	268.44	281.22	294.00	306.78	319.57	332.35	345.13	357.91	370.70
Sub-total	1533.92	1610.61	1687.31	1764.00	1840.70	1917.40	1994.09	2070.79	2147.48	2224.18
Total (i+ii+iii)	9728.92	10204.60	10680.29	11155.98	11631.66	12107.35	12583.04	13058.73	13534.41	14010.10
Contingency (@ 5% on above)	486.45	510.23	534.01	557.80	581.58	605.37	629.15	652.94	676.72	700.50
Total 'B'	19215.36	10714.83	11214.31	11713.78	12213.25	12712.72	13212.19	13711.66	14211.13	14710.60
Total Cost of Production and Sales (A+B)	22496.36	24530.95	26565.55	27065.02	27564.49	28063.96	28563.43	29062.90	29562.37	30061.84

* Assumed to increase at the flat rate of 5% straight line every year

DEVELOPMENT CONSULTANTS

JOB NO. : DCIL-105 EXHIBIT : 71

UNITED NATIONS INDUSTRIAL DEVELOPMENT ORGANISATION
AND
ARAB INDUSTRIAL DEVELOPMENT AND MINING ORGANISATION

PROJECT PROFILE ON HV AND EHV TRANSMISSION LINE TOWERS

PROJECTED PROFITABILITY STATEMENT

('000 US $)

Elements	OPERATING YEARS									
	1	2	3	4	5	6	7	8	9	10
Raw Materials and Consumables	11486.64	12922.47	14358.30	14358.30	14358.30	14358.30	14358.30	14358.30	14358.30	14358.30
Fuel	0.17	0.19	0.21	0.21	0.21	0.21	0.21	0.21	0.21	0.21
Power	205.93	231.67	257.42	257.42	257.42	257.42	257.42	257.42	257.42	257.42
Water	3.44	3.87	4.30	4.30	4.30	4.30	4.30	4.30	4.30	4.30
Labour & Plant Overhead	7979.82	8378.81	8777.80	9176.79	9575.78	9974.78	10373.77	10772.76	11171.75	11570.74
Other Factory Expenses	215.18	215.18	215.18	215.18	215.18	215.18	215.18	215.18	215.18	215.18
Administrative & Sales Expenses	1533.92	1610.61	1687.31	1764.00	1840.70	1917.40	1994.09	2070.79	2147.48	2224.18
Sub-total	21425.10	23362.81	25300.52	25776.21	26251.89	26727.58	27203.27	27678.95	28154.64	28630.33
Contingency	1071.26	1168.14	1265.03	1288.81	1312.59	1336.38	1360.16	1383.95	1407.73	1431.52
Total	22496.36	24530.95	26565.55	27065.02	27564.49	28063.96	28563.43	29062.90	29562.37	30061.84
Stock Variation	-1680.00	-158.35	-158.35	-34.42	-34.43	-34.43	-34.43	-34.42	-34.43	-34.43
Cost of Production and Sales	20816.36	24372.60	26407.20	27030.59	27530.06	28029.53	28529.00	29028.48	29527.94	30027.41
PROJECTED REVENUE	30624.00	37236.00	41412.00	41760.00	41760.00	41760.00	41760.00	41760.00	41760.00	41760.00
Profit before Interest and Depreciation	9807.64	12863.40	15004.80	14729.41	14229.94	13730.47	13231.00	12731.52	12232.06	11732.59

JOB NO. : DCIL-105

EXHIBIT : 71

('000 US $)

Elements	OPERATING YEARS 1	2	3	4	5	6	7	8	9	10
Interest										
On Term Loan - @ 10% p.a.	1043.31	1043.31	1043.31	894.27	745.22	596.18	447.13	298.09	149.04	0.00
On Working Capital Loan - @ 12% p.a.	979.47	979.47	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Sub-total	2022.79	2022.79	1043.31	894.27	745.22	596.18	447.13	298.09	149.04	0.00
Profit before Depreciation	7784.85	10840.61	13961.49	13835.14	13484.72	13134.29	12783.87	12433.44	12083.02	11732.59
Depreciation and Amortisation	943.42	943.42	943.42	943.42	943.42	943.42	943.42	943.42	943.42	943.42
Profit before Tax	6841.43	9897.19	13018.07	12891.72	12541.30	12190.88	11840.45	11490.03	11139.61	10789.18
Tax	684.14	994.45	1310.96	1383.51	1348.47	1313.43	1278.39	1243.34	1208.30	1173.26
Distributable Profit	6157.29	8902.75	11707.11	11508.21	11192.83	10877.45	10562.06	10246.67	9931.31	9615.92
Dividend	1043.31	1564.97	1564.97	2086.63	2086.63	2086.63	2608.29	2608.29	2608.29	3129.94
Retained Earnings	5113.98	7337.77	10142.14	9421.58	9106.20	8790.81	7953.78	7638.39	7323.02	6485.98
Add Back : Depreciation & Amortisation	943.42	943.42	943.42	943.42	943.42	943.42	943.42	943.42	943.42	943.42
NET CASH ACCRUAL	6057.39	8281.19	11085.55	10364.99	10049.62	9734.22	8897.19	8581.81	8266.44	7429.39

JOB NO. : DCIL-105

EXHIBIT : 72

UNITED NATIONS INDUSTRIAL DEVELOPMENT ORGANISATION
AND
ARAB INDUSTRIAL DEVELOPMENT AND MINING ORGANISATION

PROJECT PROFILE ON HV AND EHV TRANSMISSION LINE TOWERS

STATEMENT OF FIXED ASSETS AND DEPRECIATION UNDER STRAIGHT LINE METHOD

('000 US $)

Description	Value	Technical Know-how Fees	Sub-Total	Contingency	Sub-Total	Interest during Construct	Sub-Total	50% of Pre-op Expenses	Total	Rate (%)	Amount
1. Land & Land Development	1940.00	0.00	1940.00	0.00	1940.00	0.00	1940.00	0.00	1940.00	0%	0.00
2. Building & Civil Work	10362.00	506.81	10868.81	689.59	11558.40	827.64	12386.04	709.32	13095.36	[illegible]	523.81
3. Plant & Mahinery	3027.88	148.10	3175.97	201.51	3377.48	241.84	3619.32	207.27	3826.59	8%	306.13
4. Miscellaneous Fixed Assets	145.00	7.09	152.09	9.65	161.74	11.58	173.32	9.93	183.25	10%	18.32
5. Preliminary Expenses	25.00	0.00	25.00	0.00	25.00	0.00	25.00	0.00	25.00	10%	2.50
6. Pre-operative Expenses	1853.02	0.00	1853.02	0.00	1853.02	0.00	1853.02	-926.52	926.50	10%	92.65
7. Technical Know-how Fees	662.00	-662.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0%	0.00
Sub-total	18014.90		18014.90		18915.64		19996.70		19996.70		943.42
8. Contingency	900.74	0.00	900.74	-900.74	0.00	0.00	0.00	0.00	0.00		
Sub-total	18915.64		18915.64		18915.64		19996.70		19996.70		
9. Interest during Construction	1081.06	0.00	1081.06	0.00	1081.06	-1081.06	0.00	0.00	0.00		
Total	19996.70		19996.70		19996.70		19996.70		19996.70		

DEVELOPMENT CONSULTANTS

JOB NO. : DCIL-195 EXHIBIT : 73

UNITED NATIONS INDUSTRIAL DEVELOPMENT ORGANISATION
AND
ARAB INDUSTRIAL DEVELOPMENT AND MINING ORGANISATION

PROJECT PROFILE ON HV AND EHV TRANSMISSION LINE TOWERS

TAX COMPUTATION

('000 US $)

	OPERATING YEARS									
	1	2	3	4	5	6	7	8	9	10
Profit before Depreciation	7784.85	10840.61	13961.49	13835.14	13484.72	13134.29	12783.87	12433.44	12083.02	11732.59
Less : Current Depreciation	943.42	896.14	851.85	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Balance	6841.43	9944.47	13109.64	13835.14	13484.72	13134.29	12783.87	12433.44	12083.02	11732.59
Less : Unabsorbed Depreciation	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Taxable Income	6841.43	9944.47	13109.64	13835.14	13484.72	13134.29	12783.87	12433.44	12083.02	11732.59
Tax @ 10%	684.14	994.45	1310.96	1383.51	1348.47	1313.43	1278.39	1243.34	1208.30	1173.26

JOB NO. : DCIL-105

EXHIBIT : 74

UNITED NATIONS INDUSTRIAL DEVELOPMENT ORGANIZATION
AND
ARAB INDUSTRIAL DEVELOPMENT AND MINING ORGANIZATION

PROJECT PROFILE ON HV AND EHV TRANSMISSION LINE TOWERS

DEPRECIATION FOR TAX

('000 US $)

	WDV Rate	Building & Civil Work 4%	Plant & Machinery 8%	Misc. Fixed Assets 10%	Amortisation 10%	Total
Value		13095.36	3826.59	183.25	951.50	
Depreciation Year 1		523.81	306.13	18.32	95.15	943.42
Balance		12571.55	3520.47	164.92	856.35	
Depreciation Year 2		502.86	281.64	16.49	95.15	896.14
Balance		12068.68	3238.83	148.43	761.20	
Depreciation Year 3		482.75	259.11	14.84	95.15	851.85
Balance		11585.94	2979.72	133.59	666.05	
Depreciation Year 4		463.44	238.38	13.36	95.15	810.32
Balance		11122.50	2741.35	120.23	570.90	
Depreciation Year 5		444.90	219.31	12.02	95.15	771.38
Balance		10677.60	2522.04	108.21	475.75	
Depreciation Year 6		427.10	201.76	10.82	95.15	734.84
Balance		10250.50	2320.27	97.39	380.60	
Depreciation Year 7		410.02	185.62	9.74	95.15	700.53
Balance		9840.48	2134.65	87.65	285.45	
Depreciation Year 8		393.62	170.77	8.76	95.15	668.31
Balance		9446.86	1963.88	78.83	190.30	
Depreciation Year 9		377.87	157.11	7.89	95.15	638.02
Balance		9068.98	1806.77	70.99	95.15	
Depreciation Year 10		362.76	144.54	7.10	95.15	609.55
Balance		8706.22	1662.23	63.90	0.00	

WDV : Written Down Value

JOB NO. : DCIL-105 EXHIBIT : 75

UNITED NATIONS INDUSTRIAL DEVELOPMENT ORGANISATION
AND
ARAB INDUSTRIAL DEVELOPMENT AND MINING ORGANISATION

PROJECT PROFILE ON HV AND EHV TRANSMISSION LINE TOWERS

WORKING CAPITAL REQUIREMENTS
(Excluding Cash & Bank Balances)

('000 US $)

Items	OPERATING YEARS									
	1	2	3	4	5	6	7	8	9	10
1. Raw materials & Consumables	3965.25	4460.91	4956.56	4956.56	4956.56	4956.56	4956.56	4956.56	4956.56	4956.56
2. Finished Stock	1680.00	1838.35	1996.70	2031.13	2065.56	2100.00	2134.43	2168.86	2203.30	2237.73
3. Sundry Debtors	2517.04	3060.49	3403.73	3432.33	3432.33	3432.33	3432.33	3432.33	3432.33	3432.33
TOTAL	8162.29	9359.75	10356.99	10420.01	10454.46	10488.89	10523.32	10557.75	10592.19	10626.62
Increase /(decrease)	8162.29	1197.46	997.24	63.03	34.43	34.43	34.43	34.42	34.43	34.43
Stock Variation	1680.00	158.35	158.35	34.42	34.43	34.43	34.43	34.42	34.43	34.43

JOB NO. : DCIL-105 EXHIBIT : 76

UNITED NATIONS INDUSTRIAL DEVELOPMENT ORGANISATION
AND
ARAB INDUSTRIAL DEVELOPMENT AND MINING ORGANISATION

PROJECT PROFILE ON HV AND EHV TRANSMISSION LINE TOWERS

PROJECTED CASH FLOW STATEMENT

('000 US $)

	Construction Period	OPERATING YEARS									
		1	2	3	4	5	6	7	8	9	10
A. SOURCES											
Increase in Share Capital	10433.15	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Increase in Term Loan	10433.15	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Increase in Bank Loan	0.00	8162.29	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Profit before Tax with Interest added back	0.00	8864.22	11919.98	14061.39	13785.99	13286.53	12787.06	12287.59	11788.10	11288.64	10789.18
Depreciation	0.00	943.42	943.42	943.42	943.42	943.42	943.42	943.42	943.42	943.42	943.42
TOTAL 'A'	20866.30	17969.92	12863.39	15004.80	14729.41	14229.94	13730.47	13231.00	12731.52	12232.07	11732.61
B. APPLICATIONS											
Increase in Capital Expenditure	18915.64	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Increase/(Decrease) in Working Capital	0.00	8162.29	1197.46	997.24	63.03	34.43	34.43	34.43	34.42	34.43	34.43

JOB NO. : DCIL-105

EXHIBIT : 76

('000 DS $)

	Construction Period	OPERATING YEARS 1	2	3	4	5	6	7	8	9	10
Interest											
On Term Loan - @ 10% p.a.	1081.06	1043.31	1043.31	1043.31	894.27	745.22	596.18	447.13	298.09	149.04	0.00
On Working Capital Loan - @ 12% p.a.	0.00	979.47	979.47	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total Interest	1081.06	2022.79	2022.79	1043.31	894.27	745.22	596.18	447.13	298.09	149.04	0.00
Tax	0.00	684.14	994.45	1310.96	1383.51	1348.47	1313.43	1278.39	1243.34	1208.30	1173.26
Dividend	0.00	1043.31	1564.97	1564.97	2086.63	2086.63	2086.63	2608.29	2608.29	2608.29	3129.94
Repayment of Term Loan	0.00	0.00	0.00	1490.45	1490.45	1490.45	1490.45	1490.45	1490.45	1490.43	0.00
Repayment of Working Capital Loan	0.00	0.00	8162.29	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
TOTAL 'B'	19996.70	11912.54	13941.95	6406.94	5917.89	5705.22	5521.13	5858.69	5674.59	5490.50	4337.63
Opening Balance	0.00	869.60	6926.98	5848.44	14446.30	23257.82	31782.53	39991.89	47364.20	54421.13	61162.69
Surplus /(Deficit) during the Year (A - B)	869.60	6057.38	-1078.56	8597.86	8811.52	8524.73	8209.34	7372.31	7056.93	6741.56	7394.97
Closing Balance	869.60	6926.98	5848.44	14446.30	23257.82	31782.53	39991.89	47364.20	54421.13	61162.69	68557.67

DEVELOPMENT CONSULTANTS

JOB NO. : DCIL-105

EXHIBIT : 77

UNITED NATIONS INDUSTRIAL DEVELOPMENT ORGANISATION
AND
ARAB INDUSTRIAL DEVELOPMENT AND MINING ORGANISATION

PROJECT PROFILE ON HV AND EHV TRANSMISSION LINE TOWERS

PROJECTED BALANCE SHEET

('000 US $)

		OPERATING YEARS									
		1	2	3	4	5	6	7	8	9	10
	Share Capital	10433.15	10433.15	10433.15	10433.15	10433.15	10433.15	10433.15	10433.15	10433.15	10433.15
Add:	Reserves & Surplus	5113.98	12451.75	22593.89	32015.46	41121.65	49912.47	57866.25	65504.64	72827.66	79313.65
	SHAREHOLRERS' FUND	15547.12	22884.90	33027.03	42448.61	51554.81	60345.62	68299.40	75937.79	83260.81	89746.80
Less:	Intangible Assets	856.35	761.20	666.05	570.90	475.75	380.60	285.45	190.30	95.15	0.00
	TANGIBLE NET WORTH	14690.77	22123.70	32360.98	41877.71	51079.06	59965.02	68013.95	75747.49	83165.66	89746.80
Add:	Term Loan	10433.15	10433.15	8942.70	7452.25	5961.79	4471.34	2980.89	1490.43	0.00	0.00
	CAPITAL FUND	25123.92	32556.84	41303.68	49329.96	57040.85	64436.36	70994.84	77237.92	83165.66	89746.80
Less:	Net Fixed Assets	18196.94	17348.67	16500.40	15652.13	14803.86	13955.59	13107.32	12259.05	11410.78	10562.51
	NET CURRENT ASSETS	6926.98	15208.17	24803.28	33677.83	42236.99	50480.76	57887.52	64978.87	71754.88	79184.29
A.	CURENT ASSETS										
	Working Capital	8162.29	9359.75	10356.98	10420.01	10454.46	10488.89	10523.32	10557.75	10592.19	10626.62
	Cash & Bank Balance as per Cash Flow Statement	6926.98	5848.44	14446.30	23257.82	31782.53	39991.89	47364.20	54421.13	61162.69	68557.67
	TOTAL 'A'	15089.27	15208.17	24803.28	33677.83	42236.99	50480.76	57887.52	64978.87	71754.88	79184.29

JOB NO. : DCIL-105

EXHIBIT : 77

('000 US $)

	OPERATING YEARS									
	1	2	3	4	5	6	7	8	9	10
B. CURRENT LIABILITIES :										
Bank Loan	8162.29	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
TOTAL 'B'	8162.29	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
NET CURRENT ASSETS (A-B)	6926.98	15208.17	24803.28	33677.83	42236.99	50480.76	57887.52	64978.87	71754.88	79184.29

JOB NO. : DCIL-105 EXHIBIT : 78

UNITED NATIONS INDUSTRIAL DEVELOPMENT ORGANIZATION AND ARAB INDUSTRIAL DEVELOPMENT AND MINING ORGANIZATION

PROJECT PROFILE ON HV AND EHV TRANSMISSION LINE TOWERS

BREAK-EVEN ANALYSIS

('000 US $)

Sl. No.	Particulars		Amount
1.	Raw Materials and Consumables		14358.30
2.	Fuel		0.21
3.	Power		257.42
4.	Water		4.30
5.	Sub-total (1 thru 4)		14620.23
6.	Contingency		731.01
7.	VARIABLE COSTS (5 + 6)		15351.24
8.	REVENUE		41760.00
9.	CONTRIBUTION (8 - 7)		26408.76
10.	Labour & Plant Overhead*		9775.28
11.	Other Factory Expenses		215.18
12.	Administrative & Sales Expenses*		1879.05
13.	Sub-Total		11869.51
14.	Contingency		593.48
15.	Sub-Total		12462.98
16.	Interest*		821.88
17.	Depreciation		943.42
18.	FIXED COSTS		14228.28
	BREAK-EVEN SALES	18*8/9	22499.09
	BREAK-EVEN POINT (%)		53.88%
	CASH BREAK-EVEN SALES		21007.27
	CASH BREAK-EVEN (%)		50.30%

* Average over 10 years

JOB NO. : DCIL-105 EXHIBIT : 79

UNITED NATIONS INDUSTRIAL DEVELOPMENT ORGANIZATION
AND
ARAB INDUSTRIAL DEVELOPMENT AND MINING ORGANIZATION

PROJECT PROFILE ON HV AND EHV TRANSMISSION LINE TOWERS

INTERNAL RATE OF RETURN

('000 US $)

Year	Outflow	Inflow	Net Inflow
0	-20866.29	0.00	-20866.29
1	0.00	9807.64	9807.64
2	0.00	12863.40	12863.40
3	0.00	15004.80	15004.80
4	0.00	14729.41	14729.41
5	0.00	14229.94	14229.94
6	0.00	13730.47	13730.47
7	0.00	13231.00	13231.00
8	0.00	12731.52	12731.52
9	0.00	12232.06	12232.06
10	0.00	11732.59	11732.59

IRR 58.47%

Inflow = Profit before Interest,Depreciation and Tax

PLANT LOCATION : SAUDI ARABIA

COUNTRY : SAUDI ARABIA

The financial analysis and evaluation of the proposed project for setting up of HV and UHV Transmission Line Towers plant in this country are based on the capacity utilisation, price and costs.

Project Cost

The estimated cost of the project of setting up a 18,000 TPA plant is around US $ 10.05 million as can be seen from Exhibit-80. The project cost includes the expenditure towards

- Land and land development
- Building and civil work
- Plant and machinery
- Miscellaneous fixed assets
- Preliminary expenses
- Pre-operative expenses
- Technical know-how fees

Preliminary expenses have been assumed on a lumpsum basis on the project cost. Pre-operative expenses have four components, viz., establishment, travelling expenses, overseas training expenses and miscellaneous expenses. Establishment costs have been computed on the basis of salaries payable and overheads to various personnel who have to be recruited at various levels, during the construction period. Travelling expenss have been taken as approximately 12% of establishment costs in various quarters up to the seventh quarter of the construction period while in the last quarter it is taken as 5% of the establishment cost. Overseas training expenses and miscellaneous expenses have also been taken on a lumpsum basis. Technical know-how fees have been taken as 3.5% of the project cost excluding

interest during construction and margin money for working capital.

5% cushion has been provided towards contingency. This cost also includes interest during construction and margin money for working capital.

Phasing of capital expenditure is based on implementation plan, and interest during construction has been computed based on the phasing. These two are presented in Exhibits 81 and 82 respectively.

Margin money for working capital is presented in Exhibit-83. In computing margin money it is assumed that adequate provisions have to be kept towards storage of raw materials and consumables required to be imported.

The project is assumed to be financed by Debt-Equity Ratio of 1:1.

Production, Sales and Revenue

Statement of production and sales of various product range and the revenue that will be generated from the sales of the products over the 10-year period are presented in Exhibits 84 and 85 respectively. Capacity utilisation is assumed at the rate of 80% in the first year, 90% in the second year and 100% from the third year onwards.

Costs

The annual costs of production and sales computed over 10 years are presented in Exhibit-86. In estimating these costs it is assumed that the salaries and wages will increase at the flat rate of 5% every year.

Profitability

Projected profitability statement is presented in Exhibit-87. The average profit before tax works out to 23.7% of average revenue.

Statement of fixed assets and depreciation under straight line method is presented in Exhibit-88. Tax computation and depreciation for tax are presented in Exhibits 89 and 90 repspectively.

Working capital requirements are shown in Exhibit-91.

Projected cash flow statement and balance sheet over 10-year period are shown in Exhibits 92 and 93 respectively.

The project breaks even at around 60.86% and shows internal rate of return of 52.62% as can be seen from Exhibits 94 and 95 respectively. In computing internal rate of return, outflow is taken as the project cost and inflow is taken as the profit before interest, depreciation and tax.

DEVELOPMENT CONSULTANTS

JOB NO. : DCIL-105 EXHIBIT : 80

UNITED NATIONS INDUSTRIAL DEVELOPMENT ORGANIZATION
AND
ARAB INDUSTRIAL DEVELOPMENT AND MINING ORGANIZATION

PROJECT PROFILE ON HV AND EHV TRANSMISSION LINE TOWERS

ESTIMATED PROJECT COST

('000 US $)

Items	Value	Total
1. Land and Land Development (@ US$ 180 per m² for 4732 m²)	852.00	852.00
2. Building and Civil Work		
i) Workshop Building (@ US$ 903 per m² for 3713 m²)	3353.00	
ii) Administrative Building (@ US$ 1089 per m² for 509 m²)	554.00	
iii) Auxiliary Buildings (@ US$ 1089 per m² for 582 m²)	634.00	
iv) Tower Testing Station (@ US$ 903 per m² for 120 m²)	108.00	
Sub-total (2)		4649.00
3. Plant and Machinery		
i) Imported		
- Production equipment	989.17	
- Tool room equipment	83.54	
- Material handling equipment	248.54	
- Maintenance equipment	3.42	
- Auxiliary equipment and handtools	5.00	
Total F.O.B. Value	1329.67	
ii) Insurance & Freight (@ 10% of FOB Value)	132.97	
iii) C.I.F. Value	1462.64	
iv) Import duty @ 6% on CIF value	87.76	
v) Transportation @ 1% of CIF Value	14.63	
Landed Cost at Site (Sub-total (3))		1565.03

JOB NO. : DCIL-105 EXHIBIT : 80

('000 US $)

Items	Value	Total
4. Miscellaneous Fixed Assets		
i) Transformers	11.70	
ii) Switchgears	4.50	
iii) Central Airconditioning system	76.78	
iv) Overhead Fuel Storage Tank and accessories	0.50	
v) Illumination,Fans and Room Coolers	4.00	
vi) Water Pumps and Tank	5.10	
vii) Compressors	1.70	
viii) Office Furniture and Equipment	3.00	
ix) Vehicles	20.00	
Sub-total (4)		127.28
5. Preliminary Expenses	25.00	25.00
6. Pre-operative Expenses		
i) Establishment	1037.52	
ii) Travelling Expenses	90.00	
iii) Overseas Training Expenses	50.00	
iv) Miscellaneous	40.00	
		1217.52
7. Technical Know-how Fees	322.00	322.00
8. Sub-total (1 thru 5)	-	8757.83
9. Contingency @ 5% on above	-	437.89
10. Sub-total (6 & 7)	-	9195.72
11. Interest during Construction	-	359.87
12. Margin Money for Working Capital	-	500.09
TOTAL COST	-	10055.68

JOB NO. : DCIL-105 EXHIBIT : 81

UNITED NATIONS INDUSTRIAL DEVELOPMENT ORGANISATION
AND
ARAB INDUSTRIAL DEVELOPMENT AND MINING ORGANISATION

PROJECT PROFILE ON HV AND EHV TRANSMISSION LINE TOWERS

PHASING OF CAPITAL EXPENDITURE

('000 US $)

	Total	Construction Period in Quarters							
		1	2	3	4	5	6	7	8
1. Land and Land Development	852.00	0.00	213.00	639.00	0.00	0.00	0.00	0.00	0.00
2. Building and Civil Work	4649.00								
i) Workshop Building	3353.00	0.00	0.00	1031.69	1031.69	1031.69	257.93	0.00	0.00
ii) Administrative Building	554.00	0.00	0.00	237.43	237.43	79.14	0.00	0.00	0.00
iii) Auxiliary Buildings	634.00	0.00	0.00	211.33	211.33	158.51	52.83	0.00	0.00
iv) Tower Testing Station	108.00	0.00	0.00	0.00	54.00	40.50	13.50	0.00	0.00
3. Plant and Machinery	1565.03								
i) Ordering	313.00	0.00	0.00	313.00	0.00	0.00	0.00	0.00	0.00
ii) Supply, delivery at site and Installation	1252.03	0.00	0.00	0.00	0.00	0.00	0.00	1220.73	31.30

JOB NO. : DCIL-105

EXHIBIT : 81

('000 US $)

	Total	Construction Period in Quarters							
		1	2	3	4	5	6	7	8
4. Miscellaneous Fixed Assets	127.28								
i) Transformers	11.70	0.00	0.00	2.34	0.00	0.00	0.00	9.36	0.00
ii) Switchgears	4.50	0.00	0.00	0.90	0.00	0.00	0.00	3.60	0.00
iii) Central Airconditioning system	76.78	0.00	0.00	15.36	0.00	0.00	0.00	61.42	0.00
iv) Overhead Fuel Storage Tank	0.50	0.00	0.00	0.00	0.00	0.40	0.10	0.00	0.00
v) and accessories									
vi) Illumination,Fans and Room Coolers	4.00	0.40	0.00	0.72	0.72	0.72	0.72	0.72	0.00
vii) Water Pumps and Tank	5.10	0.00	0.00	0.00	2.55	1.91	0.64	0.00	0.00
viii) Compressors	1.70	0.00	0.00	0.34	0.00	0.00	0.00	1.36	0.00
ix) Office Furniture and Equipment	3.00	0.06	0.00	0.30	0.66	0.66	0.66	0.66	0.00
x) Vehicles	20.00	0.00	10.00	0.00	0.00	0.00	5.00	0.00	5.00
5. Preliminary Expenses	25.00	12.50	12.50	0.00	0.00	0.00	0.00	0.00	0.00
6. Pre-operative Expenses	1217.52								
i) Establishment	1037.52	0.00	24.80	60.90	87.60	87.60	122.88	122.88	530.86
ii) Travelling Expenses	90.00	0.00	3.00	7.00	10.00	10.00	15.00	15.00	10.00
iii) Overseas Training Expenses	50.00	0.00	0.00	0.00	0.00	0.00	10.00	10.00	30.00
iv) Miscellaneous	40.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00
7. Technical Know-how Fees	322.00	16.10	64.40	64.40	64.40	32.20	32.20	32.20	16.10
8. Sub-total (1 thru 7)	8757.83	34.06	332.70	2589.70	1705.38	1448.33	516.46	1482.94	648.26
9. Contingency @ 5% on above	437.89	1.70	16.64	129.49	85.27	72.42	25.82	74.15	32.41
10. Total (8 & 9)	9195.72	35.76	349.34	2719.19	1790.65	1520.75	542.28	1557.09	680.67

JOB NO. : DCIL-105

EXHIBIT : 82

UNITED NATIONS INDUSTRIAL DEVELOPMENT ORGANIZATION
AND
ARAB INDUSTRIAL DEVELOPMENT AND MINING ORGANIZATION

PROJECT PROFILE ON HV AND EHV TRANSMISSION LINE TOWERS

ESTIMATION OF INTEREST DURING CONSTRUCTION

('000 US $)

	Construction Period in Quarters								Total
	1	2	3	4	5	6	7	8	
Capital Expenditure	35.76	349.34	2719.19	1790.65	1520.75	542.28	1557.09	680.67	9195.72
Margin Money	0.00	0.00	0.00	0.00	0.00	0.00	0.00	500.09	500.09
Total	35.76	349.34	2719.19	1790.65	1520.75	542.28	1557.09	1180.76	9695.81
Equity	17.97	175.73	1368.37	915.53	789.09	305.33	818.35	637.47	5027.84
Loan	17.97	175.72	1368.38	915.52	789.10	305.33	818.36	637.47	5027.84
Total	35.94	351.45	2736.75	1831.05	1578.19	610.66	1636.71	1274.94	10055.68

JOB NO. : DCIL-105

EXHIBIT : 82

('000 US $)

	Construction Period in Quarters								Total
	1	2	3	4	5	6	7	8	
Interest on loan									
- @ 8% p.a.	0.18	1.76	13.68	9.16	7.89	3.05	8.18	6.37	50.27
		0.36	3.51	27.37	18.31	15.78	6.11	16.37	87.81
			0.36	3.51	27.37	18.31	15.78	6.11	71.44
				0.36	3.51	27.37	18.31	15.78	65.33
					0.36	3.51	27.37	18.31	49.55
						0.36	3.51	27.37	31.24
							0.36	3.51	3.87
								0.36	0.36
Total	0.18	2.12	17.55	40.40	57.44	68.38	79.62	94.18	359.87
Debt/Equity	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

MEANS OF FINANCING :

EQUIT	5027.84
LOAN	5027.84
TOTAL	10055.68

DEVELOPMENT CONSULTANTS

JOB NO. : DCIL-105 EXHIBIT : 83

UNITED NATIONS INDUSTRIAL DEVELOPMENT ORGANIZATION
AND
ARAB INDUSTRIAL DEVELOPMENT AND MINING ORGANIZATION

PROJECT PROFILE ON HV AND EHV TRANSMISSION LINE TOWERS

MARGIN MONEY FOR WORKING CAPITAL

('000 US $)

Sl. No.	Item	Period (Days)	Cost	Bank Finance Available (%)	Bank Finance Available (Amount)	Margin Money
1.	Raw materials & Consumables	120	1982.78	100%	1982.78	0.00
2.	Finished Stock	30	869.54	100%	869.54	0.00
3.	Sundry Debtors	30	1258.52	100%	1258.52	0.00
	Sub-total		4110.85		4110.85	0.00
4.	Expenses	30	500.09	0%	0.00	500.09
	Total		4610.93		4110.85	500.09

JOB NO. : DCIL-105

EXHIBIT : 84

UNITED NATIONS INDUSTRIAL DEVELOPMENT ORGANIZATION
AND
ARAB INDUSTRIAL DEVELOPMENT AND MINING ORGANIZATION

PROJECT PROFILE ON HV AND EHV TRANSMISSION LINE TOWERS

STATEMENT OF PRODUCTION AND SALES

(in MT)

		OPERATING YEARS									
		1	2	3	4	5	6	7	8	9	10
Capacity	(MT)	18000	18000	18000	18000	18000	18000	18000	18000	18000	18000
Utilisation		80%	90%	100%	100%	100%	100%	100%	100%	100%	100%
Annual Output	(MT)	14400	16200	18000	18000	18000	18000	18000	18000	18000	18000
Working Days/Year	(No.)	300	300	300	300	300	300	300	300	300	300
Output/Day	(MT)	48	54	60	60	60	60	60	60	60	60
Opening Stock		0	1200	1350	1500	1500	1500	1500	1500	1500	1500
Production		14400	16200	18000	18000	18000	18000	18000	18000	18000	18000
Total		14400	17400	19350	19500	19500	19500	19500	19500	19500	19500
Closing Stock		1200	1350	1500	1500	1500	1500	1500	1500	1500	1500
Sales		13200	16050	17850	18000	18000	18000	18000	18000	18000	18000

JOB NO. : DCIL-105

EXHIBIT : 85

UNITED NATIONS INDUSTRIAL DEVELOPMENT ORGANISATION
AND
ARAB INDUSTRIAL DEVELOPMENT AND MINING ORGANISATION

PROJECT PROFILE ON HV AND EHV TRANSMISSION LINE TOWERS

STATEMENT OF REVENUE

('000 US $)

	Average Selling Price (US $/MT)	OPERATING YEARS									
		1	2	3	4	5	6	7	8	9	10
HV & UHV TOWERS	1160.00	15312.00	18618.00	20706.00	20880.00	20880.00	20880.00	20880.00	20880.00	20880.00	20880.00
TOTAL		15312.00	18618.00	20706.00	20880.00	20880.00	20880.00	20880.00	20880.00	20880.00	20880.00

JOB NO. : DCIL-105 EXHIBIT : 86

UNITED NATIONS INDUSTRIAL DEVELOPMENT ORGANISATION
AND
ARAB INDUSTRIAL DEVELOPMENT AND MINING ORGANISATION

PROJECT PROFILE ON HV AND EHV TRANSMISSION LINE TOWERS

COST OF PRODUCTION AND SALES

('000 US $)

	OPERATING YEARS									
	1	2	3	4	5	6	7	8	9	10
A. Variable Cost										
Raw Materials and Consumables	5743.78	6461.75	7179.73	7179.73	7179.73	7179.73	7179.73	7179.73	7179.73	7179.73
Fuel	0.35	0.40	0.44	0.44	0.44	0.44	0.44	0.44	0.44	0.44
Power	12.72	14.29	15.87	15.87	15.87	15.87	15.87	15.87	15.87	15.87
Water	1.46	1.64	1.82	1.82	1.82	1.82	1.82	1.82	1.82	1.82
Sub-total	5758.31	6478.09	7197.86	7197.86	7197.86	7197.86	7197.86	7197.86	7197.86	7197.86
Contingency (@ 5% on above)	287.92	323.90	359.89	359.89	359.89	359.89	359.89	359.89	359.89	359.89
Total 'A'	6046.23	6801.99	7557.75	7557.75	7557.75	7557.75	7557.75	7557.75	7557.75	7557.75
B. Fixed Cost										
i) Labour & Plant Overhead *										
a) Direct labour	1501.20	1576.26	1651.32	1726.38	1801.44	1876.50	1951.56	2026.62	2101.68	2176.74
b) Indirect labour	1315.44	1381.21	1446.98	1512.76	1578.53	1644.30	1710.07	1775.84	1841.62	1907.39
c) Supervision	1514.88	1590.62	1666.37	1742.11	1817.86	1893.60	1969.34	2045.09	2120.83	2196.58
Sub-total	4331.52	4548.10	4764.67	4981.25	5197.82	5414.40	5630.98	5847.55	6064.13	6280.70

JOB NO. : DCIL-105

EXHIBIT : 86

('000 US $)

	OPERATING YEARS									
	1	2	3	4	5	6	7	8	9	10
ii) Other Factory Expenses										
a) Maintenance @ 2.5% on Plant & Equipment	39.13	39.13	39.13	39.13	39.13	39.13	39.13	39.13	39.13	39.13
b) Maintenance @ 1% on Building & Civil Work	46.49	46.49	46.49	46.49	46.49	46.49	46.49	46.49	46.49	46.49
c) Miscellaneous	17.12	17.12	17.12	17.12	17.12	17.12	17.12	17.12	17.12	17.12
Sub-total	102.74	102.74	102.74	102.74	102.74	102.74	102.74	102.74	102.74	102.74
iii) Administrative & Sales Expenses										
a) Salaries *	1055.76	1108.55	1161.34	1214.12	1266.91	1319.70	1372.49	1425.28	1478.06	1530.85
b) Overheads @ 20% of above	211.15	221.71	232.27	242.82	253.38	263.94	274.50	285.06	295.61	306.17
Sub-total	1266.91	1330.26	1393.60	1456.95	1520.29	1583.64	1646.99	1710.33	1773.68	1837.02
Total (i+ii+iii)	5701.17	5981.09	6261.01	6540.94	6820.86	7100.78	7380.70	7660.62	7940.54	8220.47
Contingency (@ 5% on above)	285.06	299.05	313.05	327.05	341.04	355.04	369.04	383.03	397.03	411.02
Total 'B'	5986.23	6280.15	6574.06	6867.98	7161.90	7455.82	7749.74	8043.65	8337.57	8631.49
Total Cost of Production & Sales (A+B) and Sales (A+B)	12032.46	13082.14	14131.82	14425.73	14719.65	15013.57	15307.49	15601.40	15895.32	16189.24

* Assumed to increase at the flat rate of 5% straight line every year

JOB NO. : DCIL-105 EXHIBIT : 87

UNITED NATIONS INDUSTRIAL DEVELOPMENT ORGANISATION
AND
ARAB INDUSTRIAL DEVELOPMENT AND MINING ORGANISATION

PROJECT PROFILE ON HV AND EHV TRANSMISSION LINE TOWERS

PROJECTED PROFITABILITY STATEMENT

('000 US $)

Elements	OPERATING YEARS 1	2	3	4	5	6	7	8	9	10
Raw Materials and Consumables	5743.78	6461.75	7179.73	7179.73	7179.73	7179.73	7179.73	7179.73	7179.73	7179.73
Fuel	0.35	0.40	0.44	0.44	0.44	0.44	0.44	0.44	0.44	0.44
Power	12.72	14.29	15.87	15.87	15.87	15.87	15.87	15.87	15.87	15.87
Water	1.46	1.64	1.82	1.82	1.82	1.82	1.82	1.82	1.82	1.82
Labour & Plant Overhead	4331.52	4548.10	4764.67	4981.25	5197.82	5414.40	5630.98	5847.55	6064.13	6280.70
Other Factory Expenses	102.74	102.74	102.74	102.74	102.74	102.74	102.74	102.74	102.74	102.74
Administrative & Sales Expenses	1266.91	1330.26	1393.60	1456.95	1520.29	1583.64	1646.99	1710.33	1773.68	1837.02
Sub-total	11459.48	12459.18	13458.87	13738.79	14018.71	14298.64	14578.56	14858.48	15138.40	15418.32
Contingency	572.97	622.96	672.94	686.94	700.94	714.93	728.93	742.92	756.92	770.92
Total	12032.45	13082.14	14131.81	14425.71	14719.65	15013.57	15307.49	15601.40	15895.32	16189.24
Stock Variation	-869.54	-80.65	-80.66	-18.69	-18.69	-18.69	-18.69	-18.68	-18.69	-18.69
Cost of Production and Sales	11162.91	13001.49	14051.15	14407.04	14700.96	14994.88	15288.80	15582.72	15876.63	16170.55
PROJECTED REVENUE	15312.00	18618.00	20706.00	20880.00	20880.00	20880.00	20880.00	20880.00	20880.00	20880.00
Profit before Interest and Depreciation	4149.09	5616.51	6654.85	6472.96	6179.04	5885.12	5591.20	5297.28	5003.37	4709.45

JOB NO. : DCIL-105

EXHIBIT : 87

('000 US $)

Elements	OPERATING YEARS 1	2	3	4	5	6	7	8	9	10
Interest										
On Term Loan - @ 8% p.a.	402.23	402.23	402.23	344.77	287.31	229.84	172.38	114.92	57.46	0.00
On Working Capital Loan - @ 10% p.a.	411.08	411.08	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Sub-total	813.31	813.31	402.23	344.77	287.31	229.84	172.38	114.92	57.46	0.00
Profit before Depreciation	3335.78	4803.20	6252.62	6128.19	5891.73	5655.28	5418.82	5182.36	4945.91	4709.45
Depreciation and Amortisation	475.56	475.56	475.56	475.56	475.56	475.56	475.56	475.56	475.56	475.56
Profit before Tax	2860.22	4327.64	5777.06	5652.63	5416.17	5179.72	4943.26	4706.80	4470.35	4233.89
Tax	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Distributable Profit	2860.22	4327.64	5777.06	5652.63	5416.17	5179.72	4943.26	4706.80	4470.35	4233.89
Dividend	502.78	754.18	754.18	1005.57	1005.57	1005.57	1256.96	1256.96	1256.96	1508.35
Retained Earnings	2357.44	3573.46	5022.88	4647.06	4410.60	4174.15	3686.30	3449.84	3213.39	2725.54
Add Back : Depreciation & Amortisation	475.56	475.56	475.56	475.56	475.56	475.56	475.56	475.56	475.56	475.56
NET CASH ACCRUAL	2833.00	4049.02	5498.44	5122.62	4886.16	4649.71	4161.86	3925.40	3688.95	3201.10

DEVELOPMENT CONSULTANTS

JOB NO. : DCIL-105 EXHIBIT : 88

UNITED NATIONS INDUSTRIAL DEVELOPMENT ORGANISATION
AND
ARAB INDUSTRIAL DEVELOPMENT AND MINING ORGANISATION

PROJECT PROFILE ON HV AND EHV TRANSMISSION LINE TOWERS

STATEMENT OF FIXED ASSETS AND DEPRECIATION UNDER STRAIGHT LINE METHOD

('000 US $)

Description	Value	Technical Know-how Fees	Sub-Total	Contin-gency	Sub-Total	Interest during Construct	Sub-Total	50% of Pre-op Expenses	Total Cost	Rate (%)	Amount
1. Land & Land Development	852.00	0.00	852.00	0.00	852.00	0.00	852.00	0.00	852.00	0%	0.00
2. Building & Civil Work	4649.00	236.07	4885.07	321.03	5206.10	263.83	5469.93	446.12	5916.05	4%	236.64
3. Plant & Mahinery	1565.03	79.47	1644.50	108.07	1752.57	88.81	1841.39	150.18	1991.57	8%	159.33
4. Miscellaneous Fixed Assets	127.28	6.46	133.74	8.79	142.53	7.22	149.76	12.21	161.97	10%	16.20
5. Preliminary Expenses	25.00	0.00	25.00	0.00	25.00	0.00	25.00	0.00	25.00	10%	2.50
6. Pre-operative Expenses	1217.52	0.00	1217.52	0.00	1217.52	0.00	1217.52	-608.52	609.00	10%	60.90
7. Technical Know-how Fees	322.00	-322.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0%	0.00
Sub-total	8757.83		8757.83		9195.72		9555.59		9555.59		475.56
8. Contingency	437.89	0.00	437.89	-437.89	0.00	0.00	0.00	0.00	0.00		------
Sub-total	9195.72		9195.72		9195.72		9555.59		9555.59		
9. Interest during Construction	359.87	0.00	359.87	0.00	359.87	-359.87	0.00	0.00	0.00		
Total	9555.59		9555.59		9555.59		9555.59		9555.59		

JOB NO. : DCIL-105

EXHIBIT : 89

UNITED NATIONS INDUSTRIAL DEVELOPMENT ORGANISATION
AND
ARAB INDUSTRIAL DEVELOPMENT AND MINING ORGANISATION

PROJECT PROFILE ON HV AND EHV TRANSMISSION LINE TOWERS

TAX COMPUTATION

('000 US $)

	OPERATING YEARS									
	1	2	3	4	5	6	7	8	9	10
Profit before Depreciation	3335.77	4803.20	6252.61	6128.19	5891.73	5655.28	5418.82	5182.36	4945.91	4709.45
Less : Current Depreciation	475.56	451.73	429.46	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Balance	2860.21	4351.47	5823.15	6128.19	5891.73	5655.28	5418.82	5182.36	4945.91	4709.45
Less : Unabsorbed Depreciation	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Taxable Income	2860.21	4351.47	5823.15	6128.19	5891.73	5655.28	5418.82	5182.36	4945.91	4709.45
Tax @ 0%	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

JOB NO. : DCIL-105

EXHIBIT : 90

UNITED NATIONS INDUSTRIAL DEVELOPMENT ORGANIZATION
AND
ARAB INDUSTRIAL DEVELOPMENT AND MINING ORGANIZATION

PROJECT PROFILE ON HV AND EHV TRANSMISSION LINE TOWERS

DEPRECIATION FOR TAX

('000 US $)

	WDV Rate	Building & Civil Work 4%	Plant & Machinery 8%	Misc. Fixed Assets 10%	Amortisation 10%	Total
Value		5916.05	1991.57	161.97	634.00	
Depreciation Year 1		236.64	159.33	16.20	63.40	475.56
Balance		5679.41	1832.24	145.77	570.60	
Depreciation Year 2		227.18	146.58	14.58	63.40	451.73
Balance		5452.23	1685.66	131.20	507.20	
Depreciation Year 3		218.09	134.85	13.12	63.40	429.46
Balance		5234.14	1550.81	118.08	443.80	
Depreciation Year 4		209.37	124.06	11.81	63.40	408.64
Balance		5024.78	1426.75	106.27	380.40	
Depreciation Year 5		200.99	114.14	10.63	63.40	389.16
Balance		4823.79	1312.61	95.64	317.00	
Depreciation Year 6		192.95	105.01	9.56	63.40	370.92
Balance		4630.83	1207.60	86.08	253.60	
Depreciation Year 7		185.23	96.61	8.61	63.40	353.85
Balance		4445.60	1110.99	77.47	190.20	
Depreciation Year 8		177.82	88.88	7.75	63.40	337.85
Balance		4267.78	1022.11	69.72	126.80	
Depreciation Year 9		170.71	81.77	6.97	63.40	322.85
Balance		4097.07	940.34	62.75	63.40	
Depreciation Year 10		163.88	75.23	6.28	63.40	308.79
Balance		3933.18	865.11	56.48	0.00	

WDV : Written Down Value

DEVELOPMENT CONSULTANTS

JOB NO. : DCIL-105

EXHIBIT : 91

UNITED NATIONS INDUSTRIAL DEVELOPMENT ORGANISATION
AND
ARAB INDUSTRIAL DEVELOPMENT AND MINING ORGANISATION

PROJECT PROFILE ON HV AND EHV TRANSMISSION LINE TOWERS

WORKING CAPITAL REQUIREMENTS
(Excluding Cash and Bank Balances)

('000 US $)

Items	OPERATING YEAR									
	1	2	3	4	5	6	7	8	9	10
1. Raw materials & consumables	1982.78	2230.63	2478.48	2478.48	2478.48	2478.48	2478.48	2478.48	2478.48	2478.48
2. Finished Stock	869.54	950.20	1030.86	1049.55	1068.24	1086.93	1105.62	1124.31	1143.00	1161.69
3. Sundry Debtors	1258.52	1530.25	1701.86	1716.16	1716.16	1716.16	1716.16	1716.16	1716.16	1716.16
TOTAL	4110.85	4711.08	5211.20	5244.19	5262.88	5281.57	5300.26	5318.95	5337.64	5356.33
Increase/(decrease)	4110.85	600.23	500.12	32.99	18.69	18.69	18.69	18.69	18.69	18.69
Stock Variation	869.54	80.65	80.66	18.69	18.69	18.69	18.69	18.68	18.69	18.69

DEVELOPMENT CONSULTANTS

JOB NO. : DCIL-105 EXHIBIT : 92

UNITED NATIONS INDUSTRIAL DEVELOPMENT ORGANISATION
AND
ARAB INDUSTRIAL DEVELOPMENT AND MINING ORGANISATION

PROJECT PROFILE ON HV AND EHV TRANSMISSION LINE TOWERS

PROJECTED CASH FLOW STATEMENT

('000 US $)

	Construction Period	OPERATING YEAR 1	2	3	4	5	6	7	8	9	10
A. SOURCES											
Increase in Share Capital	5027.84	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Increase in Term Loan	5027.84	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Increase in Bank Loan	0.00	4110.85	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Profit before Tax with Interest added back	0.00	3673.52	5140.95	6179.28	5997.40	5703.48	5409.56	5115.64	4821.72	4527.81	4233.89
Depreciation	0.00	475.56	475.56	475.56	475.56	475.56	475.56	475.56	475.56	475.56	475.56
TOTAL 'A'	10055.68	8259.93	5616.51	6654.84	6472.96	6179.04	5885.12	5591.20	5297.28	5003.37	4709.45
B. APPLICATIONS											
Increase in Capital Expenditure	9195.72	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Increase/(Decrease) in Working Capital	0.00	4110.85	600.22	500.12	32.99	18.69	18.69	18.69	18.69	18.69	18.69

DEVELOPMENT CONSULTANTS

JOB NO. : DCIL-105

EXHIBIT : 92

('000 RS $)

	Construction Period	OPERATING YEAR 1	2	3	4	5	6	7	8	9	10
Interest											
On Term Loan - @ 8% p.a.	359.87	402.23	402.23	402.23	344.77	287.31	229.84	172.38	114.92	57.46	0.00
On Working Capital Loan - @ 10% p.a.	0.00	411.08	411.08	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total Interest	359.87	813.31	813.31	402.23	344.77	287.31	229.84	172.38	114.92	57.46	0.00
Tax	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Dividend	0.00	502.78	754.18	754.18	1005.57	1005.57	1005.57	1256.96	1256.96	1256.96	1508.35
Repayment of Term Loan	0.00	0.00	0.00	718.26	718.26	718.26	718.26	718.26	718.26	718.28	0.00
Repayment of Working Capital Loan	0.00	0.00	4110.85	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
TOTAL 'B'	9555.59	5426.94	6278.57	2374.79	2101.59	2029.83	1972.36	2166.29	2108.83	2051.39	1527.04
Opening Balance	0.00	500.09	3333.08	2671.02	6951.07	11322.44	15471.65	19384.41	22809.32	25997.77	28949.75
Surplus /(-)Deficit during the Year (A - B)	500.09	2832.99	-662.06	4280.05	4371.37	4149.21	3912.76	3424.91	3188.45	2951.98	3182.41
Closing Balance	500.09	3333.08	2671.02	6951.07	11322.44	15471.65	19384.41	22809.32	25997.77	28949.75	32132.16

JOB NO. : DCIL-105 EXHIBIT : 93

UNITED NATIONS INDUSTRIAL DEVELOPMENT ORGANISATION
AND
ARAB INDUSTRIAL DEVELOPMENT AND MINING ORGANISATION

PROJECT PROFILE ON HV AND EHV TRANSMISSION LINE TOWERS

PROJECTED BALANCE SHEET

('000 US $)

		OPERATING YEAR									
		1	2	3	4	5	6	7	8	9	10
	Share Capital	5027.84	5027.84	5027.84	5027.84	5027.84	5027.84	5027.84	5027.84	5027.84	5027.84
Add:	Reserves & Surplus	2357.43	5930.89	10953.76	15600.82	20011.42	24185.57	27871.87	31121.71	34535.10	37260.64
	SHAREHOLRERS' FUND	7385.27	10958.73	15981.60	20628.66	25039.26	29213.41	32899.71	36149.55	39562.94	42288.48
Less:	Intangible Assets	570.60	507.20	443.80	380.40	317.00	253.60	190.20	126.80	63.40	0.00
	TANGIBLE NET WORTH	6814.67	10451.53	15537.80	20248.26	24722.26	28959.81	32709.51	36022.75	39499.54	42288.48
Add:	Term Loan	5027.84	5027.84	4309.58	3591.32	2873.06	2154.80	1436.54	718.28	0.00	0.00
	CAPITAL FUND	11842.51	15479.37	19847.38	23839.58	27595.32	31114.61	34146.05	36941.03	39499.54	42288.48
Less:	Net Fixed Assets	8509.43	8097.27	7685.11	7272.95	6860.79	6448.63	6036.47	5624.31	5212.15	4799.99
	NET CURRENT ASSETS	3333.08	7382.10	12162.27	16566.63	20734.53	24665.98	28109.58	31316.73	34287.39	37488.49
A.	CURRENT ASSETS										
	Working Capital	4110.85	4711.08	5281.20	5244.19	5282.88	5281.57	5460.26	5318.95	5337.64	5356.33
	Cash & Bank Balance as per Cash Flow Statement	3333.08	2671.02	6951.07	11322.44	15451.65	19384.41	22809.32	25997.77	28949.75	32132.16
	TOTAL 'A'	7443.93	7382.10	12162.27	16566.63	20734.53	24665.98	28109.58	31316.73	34287.39	37488.49

DEVELOPMENT CONSULTANTS

JOB NO. : DCIL-105

EXHIBIT : 93

('000 DS $)

	OPERATING YEAR									
	1	2	3	4	5	6	7	8	9	10
B. CURRENT LIABILITIES										
Bank Loan	4110.85	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
TOTAL 'B'	4110.85	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
NET CURRENT ASSETS (A-B)	3333.08	7382.10	12162.27	16566.63	20734.53	24665.98	28109.58	31316.73	34287.39	37488.49

DEVELOPMENT CONSULTANTS

JOB NO. : DCIL-105 EXHIBIT : 94

UNITED NATIONS INDUSTRIAL DEVELOPMENT ORGANIZATION AND ARAB INDUSTRIAL DEVELOPMENT AND MINING ORGANIZATION

PROJECT PROFILE ON HV AND EHV TRANSMISSION LINE TOWERS

BREAK-EVEN ANALYSIS

('000 US $)

Sl. No.	Particulars		Amount
1.	Raw Materials and Consumables		7179.73
2.	Fuel		0.44
3.	Power		15.87
4.	Water		1.82
5.	Sub-total (1 thru 4)		7197.86
6.	Contingency		359.89
7.	VARIABLE COSTS		7557.75
8.	REVENUE		20880.00
9.	CONTRIBUTION (8 - 7)		13322.25
10.	Labour & Plant Overhead*		5306.11
11.	Other Factory Expenses		102.74
12.	Administrative & Sales Expenses*		1551.97
13.	Sub-Total		6960.82
14.	Contingency		348.04
15.	Sub-Total		7308.86
16.	Interest*		323.55
17.	Depreciation		475.56
18.	FIXED COSTS		8107.98
	BREAK-EVEN SALES	18*8/9	12707.66
	BREAK-EVEN POINT (%)		60.86%
	CASH BREAK-EVEN SALES		11962.30
	CASH BREAK-EVEN (%)		57.29%

* Average over 10 years

JOB NO. : DCIL-105 EXHIBIT : 95

UNITED NATIONS INDUSTRIAL DEVELOPMENT ORGANIZATION AND ARAB INDUSTRIAL DEVELOPMENT AND MINING ORGANIZATION

PROJECT PROFILE ON HV AND EHV TRANSMISSION LINE TOWERS

INTERNAL RATE OF RETURN

('000 US $)

Year	Outflow	Inflow	Net Inflow
0	-10055.68	0.00	-10055.68
1	0.00	4149.09	4149.09
2	0.00	5616.51	5616.51
3	0.00	6654.84	6654.84
4	0.00	6472.96	6472.96
5	0.00	6179.04	6179.04
6	0.00	5885.12	5885.12
7	0.00	5591.20	5591.20
8	0.00	5297.28	5297.28
9	0.00	5003.37	5003.37
10	0.00	4709.45	4709.45

IRR 52.62%

Inflow = Profit before Interest, Depreciation and Tax

SECTION - 13
PROJECT IMPLEMENTATION PLAN

PROJECT IMPLEMENTATION PLAN

The implementation schedule of the key activities involved in setting up the Transmission Line Tower manufacturing plant (Annual Capacity - 36,000 MT) is presented in Exhibit-96.

The programme covers a time span of 30 months starting from the preparation and finalisation of Detailed Project Report (DPR) and ending on the commencement of commercial production. It allows adequate time for procurement and erection of the equipment. Erection of heavier equipment will become easier if procurement and installation of EOT cranes is speeded up. The total time span of 9 to 12 months for delivery of equipment have to be strictly adhered to, as this will involve international competitive bidding. Any delay in this stage will adversely affect the commissioning of the plant in time.

Recruitment of personnel has been shown in various key points during the implementation stage. Experienced personnel will be recruited within the first six quarters for senior levels.

Though not included in the key activities, it is important that the client applies for and obtains the necessary funds from the concerned financial institution well in time.

The implementation schedule of the key activities involved in setting up the Transmission Line Tower manufacturing

plant (Annual Capacity - 18,000 MT) is presented in Exhibit-97.

The programme covers a time span of 24 months starting from the preparation and finalisation of Detailed Project Report (DPR) and ending on the commencement of commercial production.

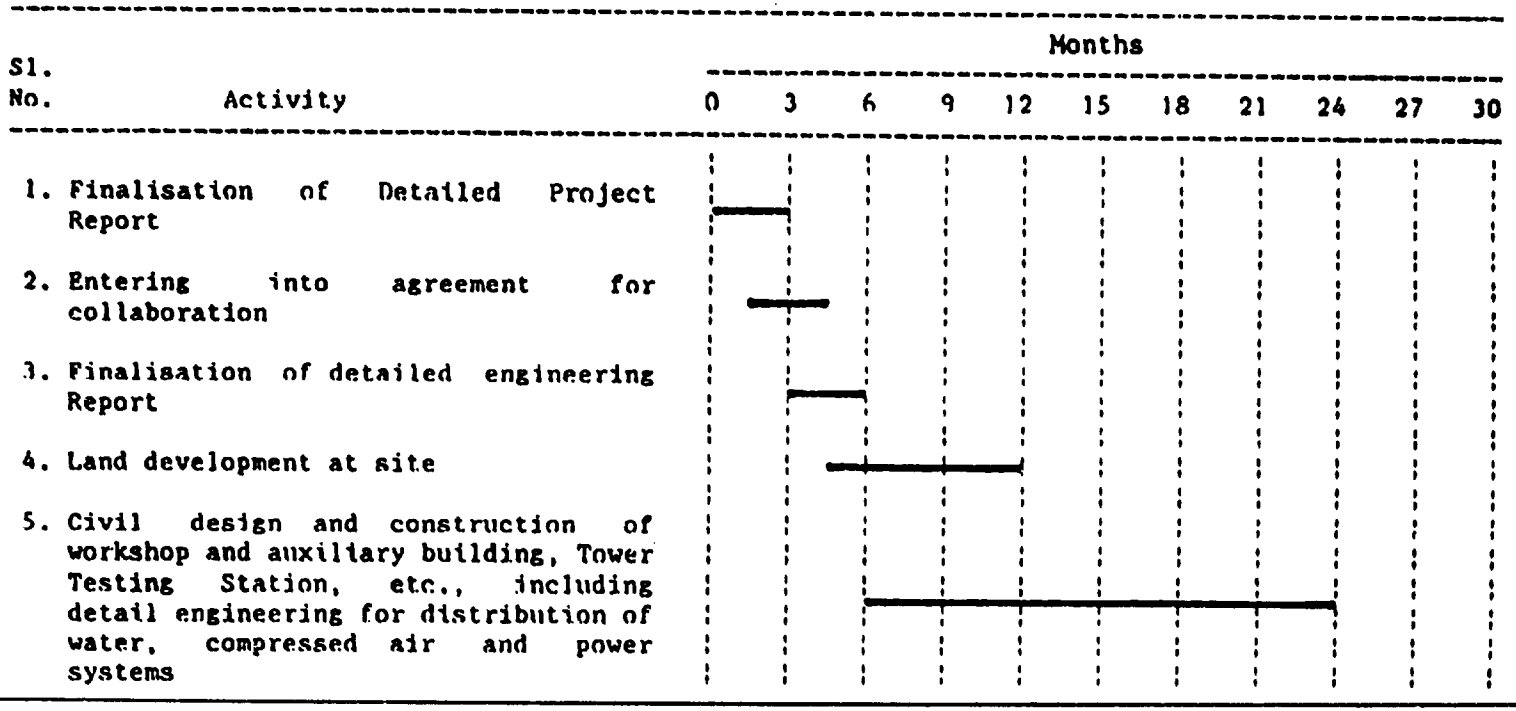
JOB NO. : DCIL-105

EXHIBIT : 96

UNITED NATIONS INDUSTRIAL DEVELOPMENT ORGANIZATION
AND
ARAB INDUSTRIAL DEVELOPMENT AND MINING ORGANIZATION

PROJECT PROFILE ON HV AND UHV TRANSMISSION LINE TOWERS

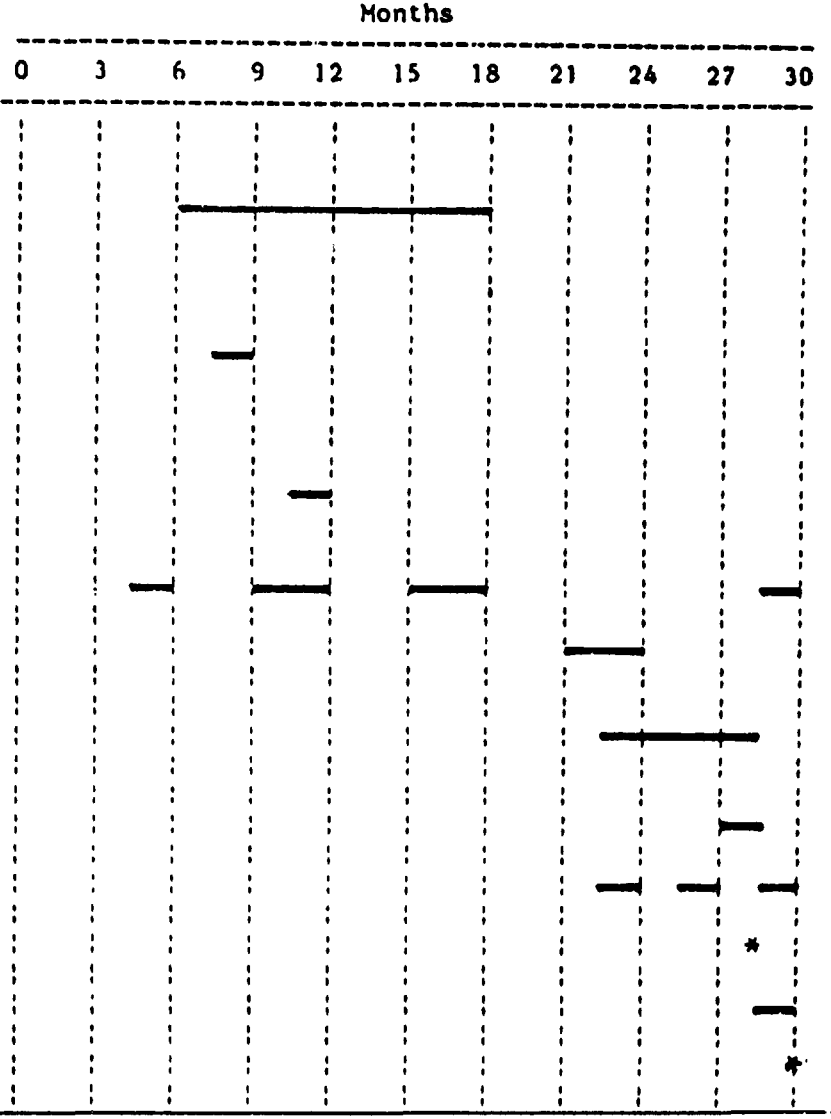
PROJECT IMPLEMENTATION SCHEDULE : HV AND UHV TRANSMISSION LINE TOWERS CAPACITY : 36,000 TPA



JOB NO. : DCIL-105

EXHIBIT : 96

Sl. No.	Activity
6.	Civil design and construction of administrative building, including design of ventilation and lighting system
7.	Preparation and floating of tender documents for procurement of equipment inclusive of main plant and machinery, utilities, EOT cranes, etc.
8.	Bid evaluation and finalisation of contracts with various equipment suppliers
9.	Recruitment of personnel
10.	Delivery of equipment at site
11.	Erection of equipment including main plant, EOT cranes and other distribution systems
12.	Equipment and Process Testing
13.	Training of personnel
14.	Commissioning of plant
15.	Trial run
16.	Commencement of commercial production



DEVELOPMENT CONSULTANTS

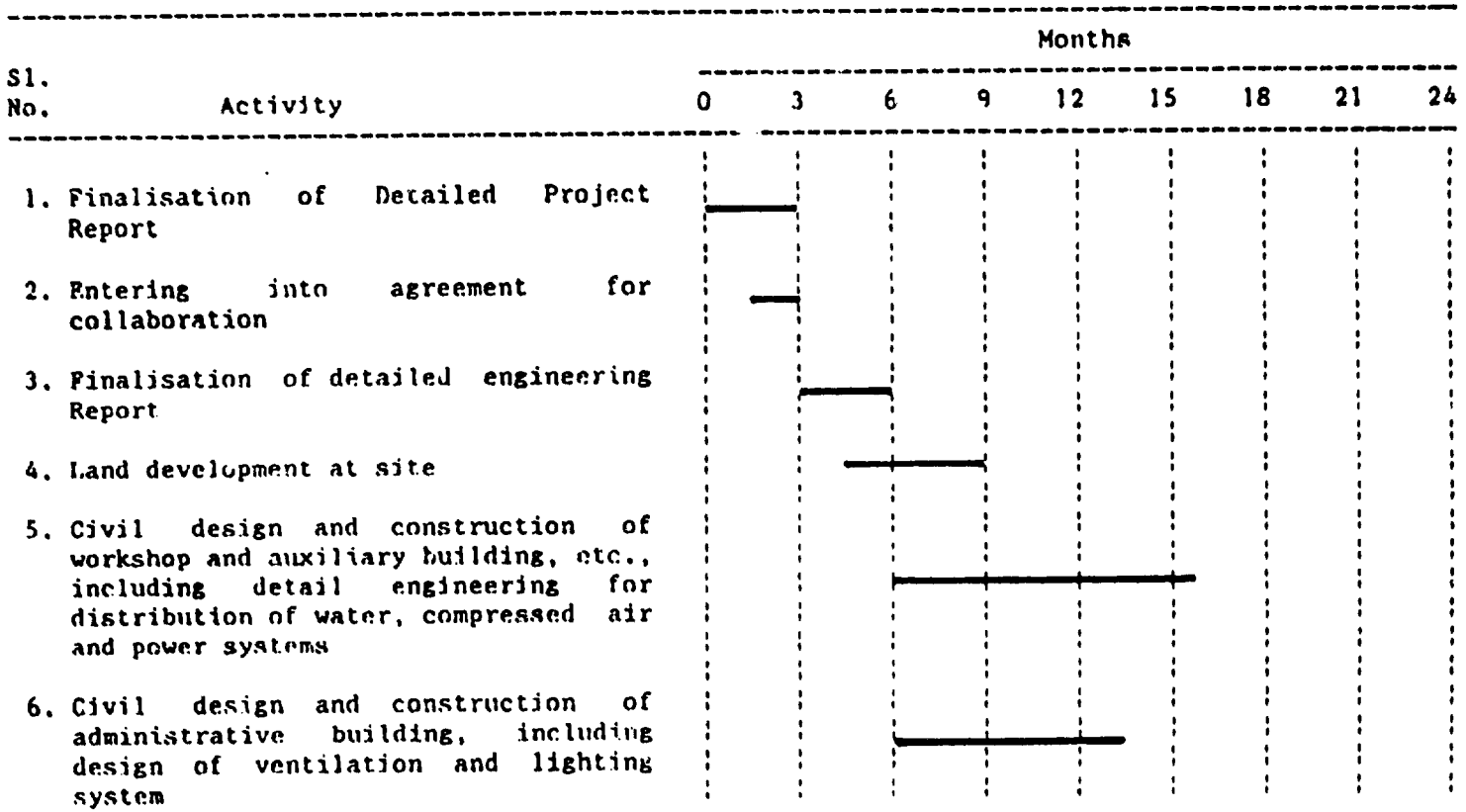
JOB NO. : DCIL-105

EXHIBIT : 97

UNITED NATIONS INDUSTRIAL DEVELOPMENT ORGANIZATION
AND
ARAB INDUSTRIAL DEVELOPMENT AND MINING ORGANIZATION

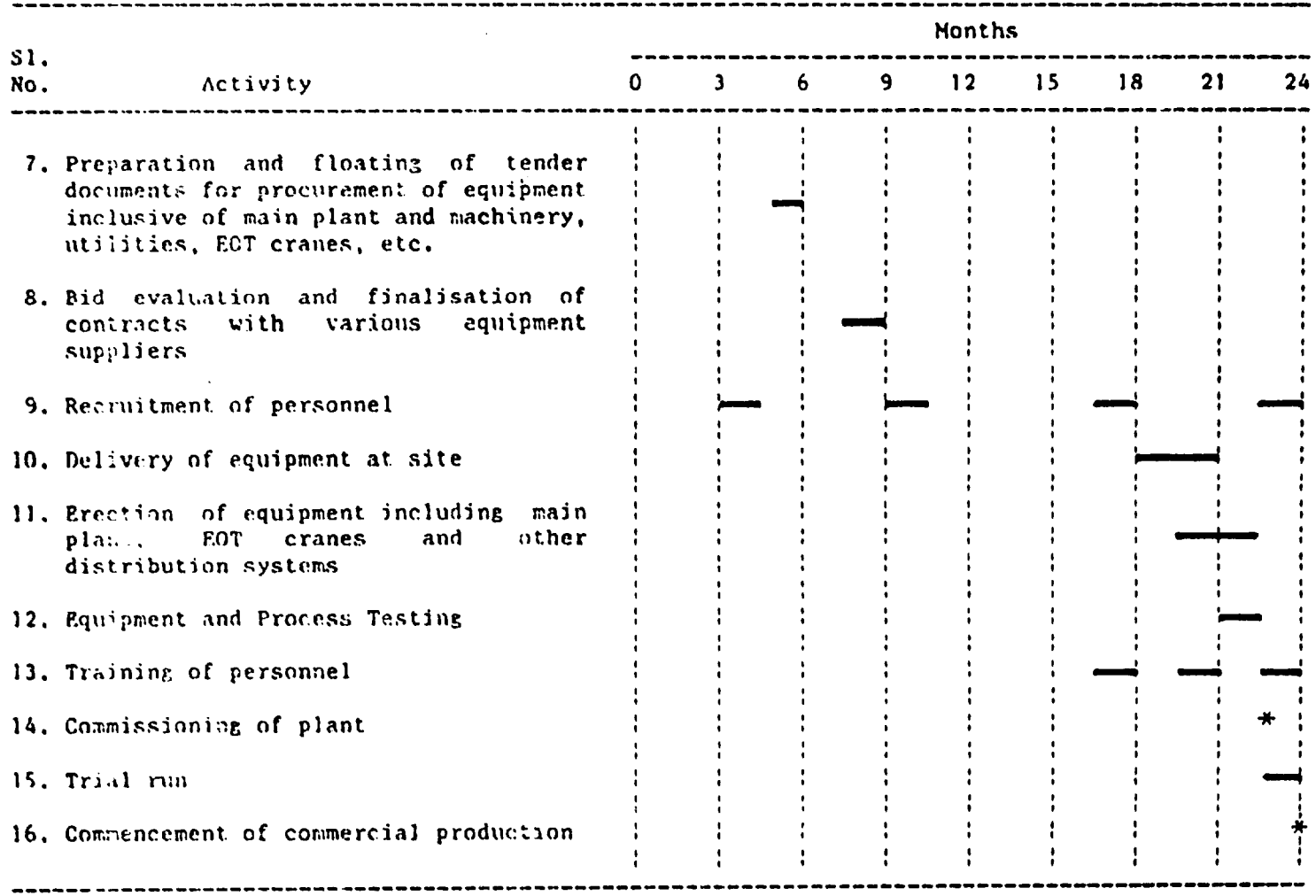
PROJECT PROFILE ON HV AND UHV TRANSMISSION LINE TOWERS

PROJECT IMPLEMENTATION SCHEDULE : HV AND UHV TRANSMISSION LINE TOWERS CAPACITY : 18,000 TPA

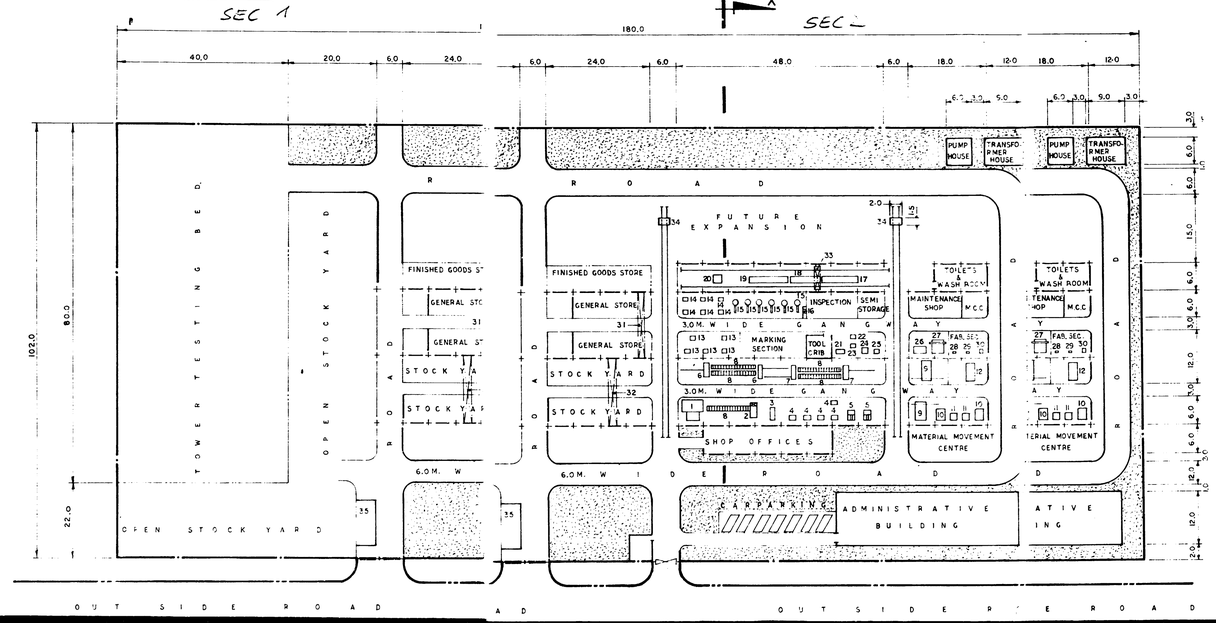


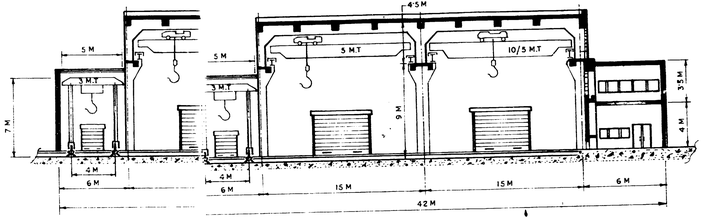
JOB NO. : DCIL-105

EXHIBIT : 97



SEC 1 SEC 2 SEC 3 SEC 4 SEC 5





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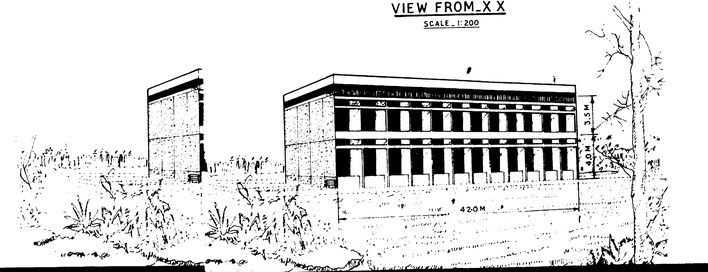

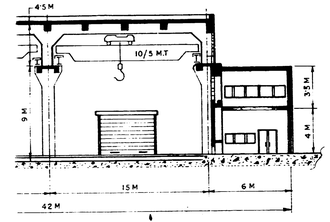

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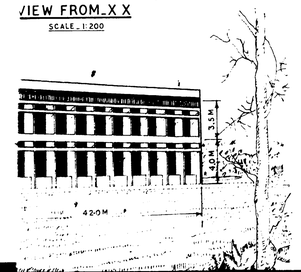


SEC 6

TOWER MANUFACTURING

R MANUFACTURING PLANT

SEC 7

SEC 8

ADM

LEGEND

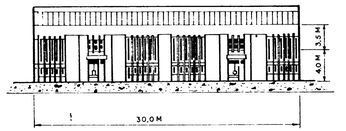
1	CROSS-CARRIAGE PROFILE CUTTING MACHINE	19	GALVANIZING TANK
2	GUILLOTINE SHEARING MACHINE	20	CENTRIFUGE
3	NOTCHING MACHINE	21	SHEARING AND CROPPING BLADE GRINDER
4	PEDESTAL GRINDER	22	COLD SAW CUTTER GRINDER
5	SHAPING MACHINE	23	DRILL POINT GRINDER
6	UNIVERSAL PUNCHING CROPPING & NOTCHING MACHINE	24	UNIVERSAL CYLINDRICAL GRINDER
7	HYDRAULIC COLD CIRCULAR SAW	25	PRECESION COLUMN DRILLING MACHINE
8	ROLLER STAND	26	PRECESION CENTRE LATHE
9	BEAM BENDING AND STRAIGHTENING MACHINE	27	UNIVERSAL MILLING MACHINE
10	HYDRAULIC PRESS	28	ARC WELDING SET
11	OIL FURNACE	29	RECTIFIER D.C WELDING SET
12	HYDRAULIC PRESS BRAKE	30	ELECTRIC HEAT TREATMENT FURNACE AND QUENCHING TANK
13	MARKING PRESS	31	E.O.T CRANE, 5 MT
14	PILLAR DRILLING MACHINE	32	E.O.T CRANE, 10/5 MT
15	RADIAL DRILLING MACHINE	33	GANTRY CRANE, 3 MT
16	BENCH GRINDER	34	BATTERY OPERATED MATERIAL MOVEMENT TROLLEY
17	ACID PICKLING TANK	35	WEIGH BRIDGE
18	WATER RINSING TANK		

ADMINISTRATIVE BUILDING
SCALE . N.T.S

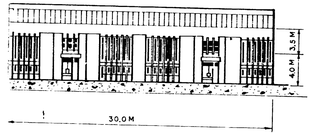
ISTRATIVE BUILDING
SCALE . N.T.S

SEC 9

SEC 10



SHOP OFFICE
SCALE . N.T.S



SHOP OFFICE
SCALE . N.T.S

REVISIONS						
NO.	RELEASE DATE	LOCATION & REMARKS	ARCH.	STR.	MECH	ELEC.
			APPROVED BY			

RELEASE STATUS	DATE	SIGNATURE
PRELIMINARY		
FOR TENDER ONLY		
FOR CONSTRUCTION		
CHECKED BY ARCH.		
CHECKED BY STR.		
CHECKED BY MECH.		
CHECKED BY ELEC.		

LAYOUT OF TOWER MANUFACTURIN

UNITED NATIONS INDUSTRIAL DEVELOPMENT ORG

ARAB INDUSTRIAL DEVELOPMENT AND MINING ORG

DEVELOPMENT CONSULTA

CONSULTING ENGINEERS
BOMBAY • CALCUTTA • MADRAS • NEW DELHI

DRAWN MUKUL	DESIGNED MUKUL	SCALE 1" N.
PROJ. ENGR. P.C.D	J & T C ENGR.	DATE 5.11.CH.
DEPT. HEAD		JOB NO. DEC.

DWG. NO. EXHIBIT_21

STATUS	DATE	SIGNATURE
KEY		
IN ONLY		
TRUCTION		
CH.		

LAYOUT OF TOWER MANUFACTURING PLANT

UNITED NATIONS INDUSTRIAL DEVELOPMENT ORGANIZATION

ARAB INDUSTRIAL DEVELOPMENT AND MINING ORGANIZATION

DEVELOPMENT CONSULTANTS

CONSULTING ENGINEERS
BOMBAY • CALCUTTA • MADRAS • NEW DELHI

DRAWN MUKUL	DESIGNED MUKUL	SCALE 1:500
PROJ. ENGR. P.C.D	J & T C ENGR.	DATE 5.11.92
DEPT. HEAD		JOB NO. DCIL.105

REV. NO.

DWG. NO. EXHIBIT_21