REPORT OF THE COMPTROLLER AND AUDITOR GENERAL
OF INDIA : UNION GOVT. (COMMERCIAL),
1984. PART IV
BHARAT HEAVY PLATE
& VESSELS LTD.

REPORT OF THE COMPTROLLER AND AUDITOR GENERAL OF INDIA

UNION GOVERNMENT (COMMERCIAL)

1984

PART IV

BHARAT HEAVY PLATE AND VESSELS LIMITED

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PREFACE

1. This report on Bharat Heavy Plate and Vessels Limited was prepared by an Audit Board consisting of the following members :

SHRI R. C. SURI (upto 30-4-1984) SHRI M. PREM KUMAR (from 1-5-1984 onwards)	Chairman, Audit Board and Ex-officio Additional Deputy Comptroller & Auditor General (Commercial).
SHRI S. Y. GOVINDARAJAN (upto end of 1983) SHRIMATI PADMA (from 1984 onwards)	Member, Audit Board and Ex-officio Director of Commercial Audit, Hyderabad.
SHRIMATI SARASWATI R. RAO	Member, Audit Board and Ex-officio Director of Commercial Audit, Madras.
SHRI V. R. PAPPU	Formerly Director (Commercial), Jessops & Company Limited, Calcutta and presently working with Davy Ashmore India Limited, Calcutta—Part-time Member.
SHRI P. V. NAIK	Chairman-cum-Managing Director, Richardson & Cruddas Limited, Bombay—Part-time Member.

2. The Report was finalised by the Audit Board after taking into account :

(a) The comments furnished by the Ministry of Industry (Department of Heavy Industry) in February 1984;

(b) The results of the discussions held with the representatives of the Ministry and the Company on 16th February 1984; and

(c) The additional information furnished by the Ministry and the Company in March 1984;

3. The Comptroller & Auditor General of India wishes to place on record his appreciation of the work done by the Audit Board and acknowledges with thanks the contribution, in particular, of the Part-time Members who are not officers of the Indian Audit and Accounts Department.

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1. OVERVIEW

1.1.1 Bharat Heavy Plate and Vessels (BHPV) Limited, incorporated in June 1966, was planned to produce equipment for the fertilizer, petroleum and allied industries. A major handicap in the development of these industries had been the need to import much of the capital equipment. The types of equipment included in BHPV's planned product-mix account for nearly half the cost of equipment in industries like fertilizer and petroleum.

1.1.2 Preliminary studies had estimated that the total capacity (21000 tonnes) of fabrication facilities available in the public and private sectors in India (including their expansion) for such equipment would fall short of requirements by about 72,000 tonnes per annum; and BHPV's proposed annual capacity of about 23,000 tonnes per annum was meant to meet about one-third of the estimated gap of 72,000 tonnes.

1.1.3 Based on a feasibility report prepared by M/s. TECHNO EXPORT, giving general details of the plant and estimates of cost for different classes of work, economic and profitability studies were made by the Government of India.

1.1.4 No detailed project report (DPR) was prepared. But M/s. TECHNO EXPORT prepared design documentation which (though not in the form of DPR) contained, according to BHPV, all relevant technical information generally given in a DPR.

1.1.5 At full capacity operation (23,210 tonnes per year) the annual sales revenue was expected to be Rs. 1020 lakhs, while the annual cost of production including depreciation and interest on loans was expected to be Rs. 820 lakhs (or Rs. 750 lakhs, without counting interest on loans).

1.1.6 Assuming equity capital of Rs. 700 lakhs and loans of Rs. 970 lakhs for making up of the total cost (excluding township) of Rs. 1670 lakhs, a return of 28.57% on equity capital or 16.2% on total capital employed was estimated.

1.1.7 Construction of the factory started in 1967 and was completed in August 1971 (about 15 months behind schedule).

1.1.8 As against the original cost estimate of Rs. 1350 lakhs, the actual capital cost came to Rs. 2345.57 lakhs.

Loss/Profit

1.2.1 The Company was expected to break even in 1971-72, according to the collaborators' feasibility report. In 1971, BHPV estimated that it would break even in 1973-74. Later, while revising the project report in June 1976, it forecast profits from 1976-77 onwards.

1.2.2 But BHPV continued to incur losses till 1978-79.

1.2.3 In August 1979, Government agreed to BHPV's request to (1) convert loans of Rs. 278.94 lakhs into equity with effect from 1-4-1978 to offset the imbalance in the financing of project cost; and (2) grant interest holiday for 3 years from 1-4-1978 on loans of Rs. 339.76 lakhs granted for non-productive purposes.

1.2.4 As shown below, 1979-80 showed profits for the first time, followed by somewhat larger profits in the next 3 years. The profits during 1979-80 and 1980-81 were mainly due to the interest subsidy granted by Government.

1.2.5 In 1983-84, BHPV showed very substantial profits of Rs. 406 lakhs.

(Rupees in lakhs)

Year	Sales during the year	Profit for the year	Loss for the year	Cumulative loss at the end of the year
1	2	3	4	5
1971-72	96·72	..	202·79	313·79
1972-73	386·06	..	85·86	402·87
1973-74	548·90	..	33·16	442·5
1974-75	994·85	..	103·84	546·20
1975-76	1675·54	..	92·90	639·10
1976-77	2539·84	..	65·85	704·95
1977-78	2191·48	..	45·60	765·08
1978-79	1631·91	..	369·34	1302·78
1979-80	2769·60	17·73	..	1269·69
1980-81	2954·81	55·24	..	1221·48
1981-82	2777·50	58·59	..	1161·29
1982-83	3992·84	56·28	..	1053·98
1983-84	4509·79	406·15	..	609·33

Note :—The Cumulative loss has been arrived after taking into account prior period adjustments and does not agree with the totals in columns 3 and 4.

1.2.6 Its cumulative loss upto 31-3-1984 was Rs. 609.33 lakhs as against the paid-up capital of Rs. 1731.28 lakhs.

1.2.7 The cumulative total of interest payments in default was Rs. 932.17 lakhs as on 31-3-1984. In addition, penal interest payable was Rs. 537.56 lakhs. From 1976-77 onwards the Company ploughed back the unpaid interest charges for use as working capital.

Low orders & output

1.3.1 From the beginning the company has been handicapped by :

— low demand (not enough orders)

— low productivity

— delays in executing orders

1.3.2 Annual out-put remained well below the rated capacity of 23,210 tonnes per year as indicated below :

	(Tonnes)
1979-80 . . .	6066
1980-81 . . .	8196
1981-82 . . .	7006
1982-83 . . .	8222
1983-84 . . .	7568

1.3.3 One reason given for the lower output was that, in the absence of enough orders for the original product-mix (especially for prefabricated piping and dished ends) BHPV was forced to diversify into more sophisticated products requiring more man-hours/machine-hours per tonne of output.

1.3.4 The projected demand from the fertilizer, chemical and allied industries turned out to be seriously over-optimistic and even a substantial portion of the expected orders did not come.

1.3.5 According to the design documentation given by TECHNO EXPORT, the production totalling 23,210 tonnes annually included 4500 tonnes of piping and 3,000 tonnes of dished ends. The Company found that there was not much demand for prefabricated piping and dished ends and so reduced their production to 1000 tonnes per annum. The overall capacity of the plant was derated to 18,000 tonnes per annum.

1.3.6 Since equipments like columns, pressure vessels, heat exchangers are also needed by other process industries like steel, atomic energy, paper and pulp, power and pharmaceuticals, the Company executed orders for these industries and diversified into the manufacture of such new products as :

— air and gas separation plants, cryogenics, storage tanks, etc., with the collaboration of AL of France

— multilayer vessels with the collaboration of Nooter Corporation of USA

— continuous pulp digestors with collaboration of Kamyr AB of Sweden

— evaporators with the collaboration of Ecodyne of USA

— boilers of the range of 200 tonnes an hour with the collaboration of Bharat Heavy Electricals Ltd.

— deaerators with the collaboration of M/s. Delas Weir of France

— Titanium Substrate Insoluble Anodes (TSIA) in collaboration with National Research Development Corporation.

Intensity factor

1.4.1 The factory was established with a capacity of 23,210 tonnes per year of a particular product-mix. In April 1975 BHPV derated the overall capacity of the plant from 23,210 to 18,000 tonnes per annum on the ground that the factory was producing more sophisticated equipment than originally intended and these needed more inputs of labour-hours and machine-hours per tonne.

1.4.2 Later, from 1980-81 onwards, BHPV evolved the practice of multiplying the actual output tonnage each year by the "intensity factor" of the previous year, to allow for the fact that some of the new products needed more inputs of man-hours/machine-hours than the original product-mix. This weighted output figure is used by BHPV for comparison with the installed capacity as below (which now has to be taken as 23,210 tonnes):

Table 1.4.2A

Year	Actual* production (Tonnes)	Intensity factor	Production as declared by Company i.e. weighted tonnage
1980-81 . .	7382	1.97	13949
1981-82 . .	6291	1·65	13298
1982-83 . .	7272	1·52	12930
1983-84 . .	6530	1·89	10964

(*Excluding bought-out components and erection)

1.4.3 The "intensity-factors" were not based on industrial engineering studies, and are not authoritative. Application of intensity factors has not been approved either by the Board of Directors or by the Government of India.

Manpower & Productivity

1.5.1 In the project report, the Collaborators recommended, for an annual production of 23,210 tonnes, a total employee strength of 2,110, of which 832 (about 38%) were to be direct workers. BHPV made its own assessments from time to time, varying from 2,568 in 1967 to 4,149 in 1974.

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1.5.2 In 1983-84, the actual strength was 4188 including 1,066 (25%) direct workers. The actual tonnage produced was 7568 and even applying BHPV's own intensity factor, the total is far below 23,210 tonnes.

1.5.3 During the last 5 years there was steady increase in indirect workers from 876 in 1979-80 to 1,215 in 1983-84 as the Company regularised casual labourers and categorised them as indirect workers; and again in 1982-83 diverted some direct workers to indirect. In 1983-84, indirect workers formed the largest of the four groups, being 29% of the total. Instead of being 84% of direct workers (as in project report) indirect workers were 114%—the annual cost of the excess being Rs. 78.75 lakhs.

1.5.4 The number of supervisors, officers and "others" rose from 950 to 1,178 in the last 5 years while the number classified as 'direct workers' fell steadily from 1,271 in 1979-80 to 1066 in 1983-84. The total rose from 3,825 to 4,188 in these 5 years.

1.5.5 The percentage of idle labour hours to net hours available which was 11% in 1979-80 rose to 27% in 1983-84, the peak figure being 40% in 1981-82. The highest percentages of idle hours in 1983-84 were recorded by the light machine shop, tool room and tool manufacturing shop (all about 40%).

1.5.6 "Want of work, tools etc." accounted for 77% of the idle hours, in 1983-84 and the cause of the major part of idle hours (475,409 hours) was shown as "waiting for work".

1.5.7 To improve productivity, the Company in 1979 introduced a production incentive scheme which provided for incentive payments for those who achieved more than 70 productive standard man hours (PSMH) a month (out of the available 200 man hours and the average of 150 PSMH at normal pace). It was stated that the base was kept at 70 PSMH because only 60 PSMH average had been reached by then but it would be difficult now to change the base figure of 70 PSMH although it had been exceeded generally.

1.5.8 Though the total PSMH rose from 10.96 lakhs hours in 1979-80 to 14.81 lakhs in 1980-81, it fell thereafter to 12.57 lakhs in 1983-84, although Rs. 11.22 lakhs was paid as incentive. Although the Company had expected that the output would progressively increase from 7,700 tonnes in 1979-80 to 12,800 tonnes in 1983-84, this did not happen. The actual tonnage in 1983-84 was only 7,568 tonnes.

1.5.9 The incentive scheme was started in 1979. In 1979-80, absenteeism was about 18%; in the following 4 years it remained steady at about 14%. In 1979-80, the percentage of idle man-hours was 11 and of idle machine hours 43%. Both these percentages rose sharply in subsequent years, reaching 27 and 68 respectively in 1983-84.

1.5.10 The scheme of welder's allowances introduced in 1973, presupposed that productivity standards would be fixed and actual productivity would be measured against these. The Company did not fix productivity standards and did not maintain records to measure actual productivity.

Machine Idleness

1.6.1 The percentage of idle machine hours to available hours was over 68 in each of the last 3 years. The reasons given by BHVP were that the order book position was low, materials were not received in time, and the actual product-mix was very different from the product mix given in the original project report. Causewise analysis of idle machine hours was not prepared (except for 1978-79 and 1979-80) due to "practical difficulties."

1.6.2 Among the high-value machines not used at all for over 2 years was the Electro-slag welding machine (Value : Rs. 5.69 lakhs).

1.6.3 Though plant and machinery valued at Rs. 18.82 crores was installed (upto March 1984) BHPV does not prepare any forecast of the load on the machines/machine centres, which would facilitate planning for profitable utilisation of surplus capacity.

Sales & Marketing

1.7.1 The lean order-book position and severe competition from Indian and foreign companies often forced BHPV to accept very difficult Commercial terms and prices with little or no margin. Sometimes, quotations based on marginal cost were submitted. Most of the tenders were for the public sector which gave 10% price preference to BHPV.

1.7.2 During the last 5 years, BHPV submitted quotations totalling about Rs. 603.66 crores out of which it got orders worth Rs. 348.82 crores.

1.7.3 An analysis of 30 high-value rejected tenders quoted during 1980-81 to 1982-83 showed that the main reasons for losing orders were : high rates quoted, unsuitable delivery schedule. BHPV said that by taking forward action like engineering work, it had reduced delivery periods to 14 months and lowered prices.

1.7.4 BHPV could not get any orders for direct export of normal equipment and for supply of Air and Gas separation plants against global tenders. On

orders linked to IDA credit (though 15% price preference is allowed over the c.i.f. prices of foreign tenders) the Company could get orders only upto 49% of the total value of the offers quoted.

1.7.5 Out of 1739 orders executed upto 1983-84, BHPV showed losses in 891 cases, i.e. over half the total orders. In 16 high value contracts for a total value of Rs. 589 lakhs, the loss was Rs. 545 lakhs, mainly due to initial under-estimation of costs, acceptance of uneconomic prices, time and cost over runs, non-recovery of development costs from the customers, etc.

1.7.6 Rs. 288.02 lakhs deducted by the customers as liquidated damages for delays in supply, non-settlement of accounts for materials and for sundry reasons is pending settlement to end of March, 1984.

Material Management

1.8.1 The closing stock of the total inventory which was Rs. 2467.61 lakhs to end of March 1979 increased to Rs. 6144.61 lakhs to end of March 1984. As compared to the norms fixed by the B.P.E., the inventory held to end of March 1984 was in excess by Rs. 451.23 lakhs.

1.8.2 Finished goods valued at Rs. 14.21 lakhs were lying in stock for more than one year because the Government customers did not have funds to pay.

Costing System

1.9.1 A comparison of actual costs of completed jobs with the cost estimates revealed that the fabrication costs were higher than the estimates by 80 to 100% in 1978-79 and 1979-80.

1.9.2 Analysis of material cost variance is not being done for the completed orders. BHPV has since been following sale order budgeting and control system.

1.9.3 The costing system is deficient in that the total labour hours purchased are not being reconciled with the total hours booked and a common rate is being adopted for absorption of overheads resulting in distortion in the valuation of work-in-progress/ finished stocks.

1.10.1 The Statutory Auditors of BHPV opined that the Internal Audit Department needs to be strengthened with more personnel to make it more effective.

2. INTRODUCTION

2.1.1 In July, 1965 the Government of India decided to set up a factory for making pressure vessels, heat exchangers, distillation and absorption columns, etc., mainly used by fertilizer, petroleum and allied industries. The scheme was based on a report submitted in July, 1965 by Techno-Export, Czechoslovakia. A company named 'Bharat Heavy Plate and Vessels Limited' (BHPV) was incorporated on 25th June, 1966 at Visakhapatnam.

2.2. Objectives

2.2.1 The Company, on a directive from the Ministry of Industry (May 1978), set out in March, 1979 these broad objectives :

- To achieve a leading position in designing, engineering and manufacturing of quality process, storage and distribution equipment required by various industries.
- To design, engineer and manufacture cryogenic plants and create a net-work for distribution of cryogenics liquids.
- To achieve a leading position in research and development in different fields of engineering and technology in the areas of work relating to its business and to strive for greater self-reliance through import substitution.
- To act as consulting engineers in all the above fields, to carry out erection and commissioning tasks and gradually achieve capability to handle total turn-key jobs.
- To develop export markets with a view to earning foreign exchange.
- To develop competent managerial personnel capable of meeting profit and growth objectives of the Company.
- To give a fair return on the capital employed.
- To achieve effective utilisation of the capacities installed.

2.2.2 BHPV did not, however, set out its micro-objectives as urged by the Bureau of Public Enterprises (BPE) in May 1979.

2.2.3 In 1979-80, BHPV prepared a draft Corporate Plan for the 6 years from 1980-81 to 1985-86. The Company said (September 1983) that the Corporate Plan was being up-dated and the short-term goals would also be duly quantified at that time.

2.2.4 The production figures projected in the draft Corporate Plan and in the yearly budgets as well as the actual production figures upto 1983-84 were as follows :

(Rupees in lakhs)

Year		Projection in the draft Corporate Plan	Budgeted production	Actuals
1980-81	Process Plant	2175	2252	2515
	Cryogenics	1000	822	814
	Boilers	50	151	120
		3225	3225	3449
1981-82	Process Plant	2200	1989	1880
	Cryogenics	1100	1284	1295
	Boilers	200	182	123
		3500	3455	3298
1982-83	Process Plant	2250	2678	3040
	Cryogenics	1150	1311	1048
	Boilers	400	211	128
		3800	4200	4216
1983-84	Process Plant	2350	3778	3445
	Cryogenics	1200	1605	1700
	Boilers	650	123	263
		4200	5506	5408

2.2.5 Thus actual production was more than the projections in the draft Corporate Plan in 1980-81, 1982-83 and 1983-84 but less in 1981-82.

3. ORGANISATIONAL SET UP

3.1.1 The Company is managed by a Chairman and Managing Director who is the Chief Executive and who works under the overall superintendence of the Board of Directors. There are no functional directors.

Annexure I gives the organisational set up of the Company effective from October 1983.

4. CAPITAL STRUCTURE

4.1.1 Capital

The authorised and paid up capital of the Company as on 31st March 1984 was Rs. 1800 lakhs and Rs. 1731.28 lakhs respectively. The long term loans taken from Government and outstanding as on 31st March 1984 were Rs. 1418.84 lakhs; the debt-equity ratio as on that date was 0.82:1.

4.2 Default in repayment of loans and interest

4.2.1 The project was to be financed by the Government by equity and loans equally. Accordingly loans were taken from Government to meet capital expenditure; and also (as the project estimates had not provided for working capital) for working capital; or to cover cash losses and repayments of loan instalments as well as interest.

4.2.2 In March 1978, the Company requested Government to restructure the capital base and to give relief as follows :

(A) Convert loans of Rs. 278.94 lakhs into equity with effect from 1st April 1978 to offset the imbalance in the project cost.

(B) Grant interest holiday for 3 years with effect from April 1978 on loans amounting to Rs. 339.76 lakhs granted for non-productive purposes.

(C) Grant moratorium on the repayment of loan balance outstanding (Rs. 1769.10 lakhs) and on the payment of interest charges for 3 years from April 1978; and reschedule them over a period of 10 years after expiry of the moratorium period.

(D) Waive penal interest on the defaulted repayments of loans and interest charges.

4.2.3 In August 1979, the Government agreed to give reliefs as at (A) and (B) above (these were sanctioned in August 1980) and to consider (C) at the end of 1979-80, taking into account the capacity of the Company to repay these amounts after giving financial reliefs at (A) and (B).

4.2.4 In September 1980, the Company again sought moratorium on loan repayments for 5 years from April, 1980 and rescheduling them over 9 years thereafter.

4.2.5 In September, 1981, the Company again asked for moratorium for 4 years from April, 1981 on interest charges (Rs. 928.03 lakhs) as on 31st March, 1981. No decisions on (C) and (D) have so far been taken by the Government (March 1985).

4.2.6 When the Audit Board asked why these decisions were delayed, the Ministry representatives said (February, 1984) that the proposal to re-organise the capital structure had been referred to a special committee whose recommendations were awaited; and that interest moratorium by itself would not guarantee that the Company would work efficiently, and the Government had been advising the Company to achieve greater efficiency in working, improve productivity, achieve efficiency of operations and economy in costs so as to improve its over-all performance.

4.2.7 The cumulative total of interest in default as well as penal interest payable to end of March 1984, worked out to Rs. 932.17 lakhs and Rs. 537.56 lakhs respectively. According to the Company these defaults were due to :

(a) losses from inception to the end of 1978-79;

(b) absence of provision for working capital in the approved project report; and

(c) huge cash losses during 1969-70 to 1972-73 and 1978-79 which depleted the working capital.

4.2.8 The Company also said (July 1983) "With the increase in the turnover and continuous losses, the utilisation of cash credit was at its peak by 1976-77 from which year the Company started ploughing back the interest charges as a source of working capital".

4.3 Cash credit

4.3.1 For meeting its working capital requirements the Company has cash credit arrangements with the State Bank of India against hypothecation of stocks stores including raw materials, book debts, etc. The limit which was Rs. 50 lakhs in 1970-71 rose to Rs. 1150 lakhs in 1978-79. The Company made use of the facility upto 1981-82 on which a total amount of Rs. 1056.11 lakhs was paid towards interest.

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5. PROJECT ESTIMATES

5.1.1 Based on the report of Techno-Export, the Company prepared in September 1965 an estimate of Rs. 1350 lakhs for implementing the project. This estimate was raised four times, and the last revision in May 1978 was to Rs. 2294.81 lakhs. (To end of March 1984 Rs. 2345.57 lakhs have been spent). The reasons for the increase were mainly as follows :

(i) Indian Rupee was devalued in June 1966.

(ii) Cost of civil works rose as wages and material costs went up.

(iii) Establishment cost was higher than estimated.

(iv) Interest liability of Rs. 74 lakhs on the loans taken from Government upto the date of completion of the factory, had not been provided for in the original estimate.

(v) Switch-over from low and medium pressure equipment to high pressure vessels, necessitated buying foreign technical know-how.

(vi) A captive oxygen plant was set up at a cost of Rs. 58.19 lakhs to meet all internal requirements and to train workers in the fabrication and operation of oxygen plants.

(vii) Additional balancing facilities were created at a cost of Rs. 103.62 lakhs to remove constraints on production and to make use of the existing facilities fully.

(viii) Construction of a township was not provided for in the initial estimate.

5.2 Township

The Company actually built 1093 houses and other buildings at a cost of Rs. 308.90 lakhs as against the estimated requirements of 1846 quarters and utility buildings at a cost of Rs. 278 lakhs in 1969. The number of quarters built upto 31-3-1984 resulted in 26 per cent satisfaction (provision of quarters) as against the BPE norm of 55 per cent.

6. COLLABORATION AGREEMENTS

6.1 The agreement with Techno Export, Czechoslovakia in November 1965 for technical assistance provided for buying technology for manufacturing pressure vessels, furnaces, heat exchangers, and the like but not the design of special equipments. In October 1967 the Company felt the need to include facilities for manufacturing some specialised equipments also. The Company therefore entered into eleven agreements with various Collaborators from February 1971 onwards for manufacture of air and gas separation plants, multilayer vessels, storage and transportation vessels, industrial boilers, etc.

6.2 Agreement with Bharat Heavy Electricals Limited (BHEL)

The agreement of February 1981 with BHEL provided for transfer of technical know-how on industrial boilers in the range of 50 to 100 tonnes/hour steaming capacity; after 3 years, (i.e. after February 1984) this was to be extended to cover boilers upto 200 tonne/hour steaming capacity. Thus, upto February 1984, BHPV could produce only small capacity boilers (where there is severe competition), but has already been able to get orders worth Rs. 17 crores.

6.3 Agreements with customers

6.3.1 One of the declared objectives of the Company is to achieve leading position for designing, engineering and manufacturing of various plants, vessels and equipments and also to achieve a leading position in research and development in the different fields of engineering and technology in areas of work relating to its business. But the Company has so far manufactured equipment based on engineering know-how and design supplied by the customers' consultants in respect of process plants. The supply agreements of the Company with its customers leave very little freedom for the Company in the matter of designing, engineering and manufacturing the plants and equipment. In fact the consultants are involved even in procurement of materials.

6.3.2 It would, therefore, appear that the Company could not so far achieve its declared objective.

6.3.3 The Company stated (September 1983) that to achieve self-reliance, they have entered into new collaboration agreements with BHEL (February 1981) for the manufacture of boilers of various capacities and with M/s. AL, France (April 1982) for know-how in cryogenic field.

7. PRODUCTION PERFORMANCE

7.1 Establishment of capacity

7.1.1 M/s. Techno Export, Czechoslavakia, in their report for establishing the factory, indicated an annual capacity of 23,210 tonnes for the factory on two-shift basis. In September 1966, the Government of India prepared a check list for projects in the public sector and estimated the requirements of plate and vessels type of equipment (including heat exchangers and allied items) by fertilizer, chemical, petroleum and metallurgical industries, at about 93,000 tonnes per annum. After reckoning the existing capacity of about 21,000 tonnes in both public and private sectors including expansion of existing plants, a gap of the order of 72,000 tonnes per annum between demand and supply was estimated. Thus, the established capacity of 23,210 tonnes per annum, on two shift basis, in BHPV was expected to meet only 1/3rd of the estimated gap.

7.1.2 The Management, however, reported to the Board (April 1975) that the product-mix was being tilted year after year towards more high-value and sophisticated items than was conceived in the design documentation given by the Collaborators. As adequate orders were not forthcoming for pipe fabrication and dished ends, the Company revised the annual capacity of the factory to 18000 tonnes.

7.1.3 The following table compares the revised product-mix with the capacities as originally envisaged.

(In tonnes)

Product	As per design documentation	As revised
Columns	5,100	7,000
Vessels :		
Non-pressure vessels	3,600	200
Cryogenics	..	200
Storage vessels	1,100	700
Tonne containers	..	500
Vessels with stirrers	210	200
Vessels above 75mm thickness	..	500
Horton spheres	700	700
Other Vessels	..	1,500
Furnaces	1,000	300
Heat exchangers	2,750	3,000
Piping	4,500	500
Spares	250	500
Structures	1,000	600
Pressed parts (dished ends)	3,000	500
Multilayer vessels	..	500
Air and Gas separation plants (cold box)	..	600
Total	23,210	18,000

7.1.4 The Company having originally installed plant and machinery (estimated cost Rs. 1061 lakhs) for an annual production of 23, 210 tonnes created additional facilities in 1976 at a cost of Rs. 20.70 lakhs for the revised product-mix, estimated to increase from 9,700 tonnes in 1976-77 to 18,000 tonnes in 1980-81.

7.2 Utilisation of capacity

7.2.1 The capacities installed, the targets and the actual tonnage produced during 1976-77 to 1983-84 are given below :

(In tonnes)

Year	Capacity originally envisaged	Revised capacity	Target fixed	Actual achievement	Percentage of achievement to		
					Installed capacity	Revised capacity	Target
1976-77	23210	18000	9690	8461	36.5	47.0	87.3
1977-78	23210	18000	10104	10889	46.9	60.5	107.8
1978-79	23210	18000	7100	6516	28.1	36.2	91.8
1979-80	23210	18000	8000	6066	26.1	33.7	75.8
1980-81	23210	18000	6500	8196	35.3	45.5	126.1
1981-82	23210	18000	8162	7006	30.2	38.9	85.8
1982-83	23210	18000	8114	8222	35.4	45.7	101.3
1983-84	23210	18000	8022	7568	32.6	42.0	94.3

As shown above, the target figures each year were less than half the original capacity of 23210 and were far below even the rated capacity of 18000.

Thus the actual utilisation of capacity (based on the reduced capacity of 18000 tonnes) ranged from 33.7% (1979-80) to 60.5% (1977-78) during these years. Except in 1977-78, it was below 50% in all these years.

7.2.2 Product-wise production tonnage **vis-a-vis** capacity during 1976-77 to 1983-84 are given below:

(In tonnes)

Product	Installed capacity	Revised achievable capacity	1976-77	1977-78	1978-79	1979-80	1980-81	1981-82	1982-83	1983-84
Columns	5,100	7,000	1,533	1,242	412	488	614	779	1,051	647
Vessels—										
Non-pressure vessels	3,600	200	993	3,556	2,070	596	496	1,855	926	1,190
Cryogenics	..	200	1,943	56	80	141	40	211	19	49
Storage vessels	1,100	700	365	..	1	1,148	2,468	129	493	255
Tonne containers	..	500	..	..	..	..	..	..	..	..
Vessels with stirrers	210	200	215	19	49	27	61	..	12	..
Vessels above 75mm thickness	..	500	..	..	..	..	..	..	..	..
Horton spheres	700	700	1,300	1,667	762	256	206	525	2,126	747
Other vessels	..	1,500	..	498	671	350	557	217	256	693
Furnaces	1,000	300	66	3	14	430	2	..	..	..
Heat exchangers	2,750	3,000	1,166	1,212	884	979	1,330	1,067	796	884
Piping	4,500	500	12	4	239	499	517	417	478	446
Spares	250	500	177	..	..	..	..	..	..	..
Structures	1,000	600	25	327	535	395	292	186	246	533
Pressure parts (dished ends)	3,000	500	230	85	125	54	199	Nil	62	..
Multi layer vessels	..	500	60	423	13	14	..	156	188	182
Air and Gas separation plants (cold box)	..	600	..	25	26	367	300	315	186	390
Shop equipments	..	..	376	376	236	278	300	434	433	514
Boughtout components	..	..	..	1,396	399	44	361	554	784	738
Erection	..	..	..	..	..	..	53	161	166	300
Total	23,210	18,000	8,461	10,889	6,516	6,066	8,196	7,006	8,222	7,568

7.2.3 The Company gave the following reasons from time to time for the under-utilisation of capacity:

(i) absence of standard and repetitive jobs;

(ii) low order book position due to uncertain demand for capital equipment in process industries ;

(iii) unwillingness of prospective customers to wait for a minimum cycle time of 18 to 24 months;

(iv) multiple stages of inspection and long gestation period required for conceiving and launching major diversification in the heavy industries;

(v) production of oxygen plants, storage tanks, etc., which is low in terms of weight but high in terms of value ;

(vi) part of the pipe fabrication required to be done at site; and

(vii) the level of skill, essential in this sophisticated industry, can be built only over a period of time.

7.2.4 The Company stated (July 1983) that the original project report envisaged a large amount of low technology items, catering to process industry at the technology level of 1965-66, but the product types and sizes originally envisaged have undergone drastic change due to changes in technology, resulting in change of demand patterns, introduction of new products, competition in low technology items, etc.

The Ministry stated (February 1984) "BHPV being a jobbing shop, most of the products are tailor-made to suit the specific requirements of the customers, Hence the production can be planned only based on the firm orders received from the customers. Therefore, the capacity utilisation is closely related to the order book position. While the order book position for the conventional products was becoming critical and lean, BHPV has taken up many diversification schemes from time to time for effective utilisation of its capacity. Some of these diversification schemes call for more technological content than the earlier equipment. Therefore, the capacity utilisation in terms of physical production could not give fair representation....."

7.2.5 When the Audit Board asked about the steps taken by BHPV to establish in-house design capability to improve production technologies, the Ministry representatives said (February 1984) that to improve design capabilities about 100 employees have been added recently; new collaboration agreements were being reached for improving technology and the Company was also trying to strengthen its own R&D, effect methods improvements, etc.

7.3 Pipes and dished ends

7.3.1 Fabrication of pipes and dished ends are two areas where the anticipations of the Company proved far too optimistic. These are further discussed below :

Pipe fabrication

7.3.2 Based on the demand for bends, branches and straight pipes (which could be pre-fabricated) an annual capacity of 4,500 tonnes for pipe fabrication was included in the detailed project report. Though prefabricated piping was not yet popular in India at that time, BHPV was confident that the situation was bound to change.

Accordingly equipment worth Rs. 27.15 lakhs was installed for an annual production capacity of 4,500 tonnes. The equipment included a tube bending machine costing Rs. 12.22 lakhs.

7.3.3 As it did not get enough orders the Company projected in 1975 a capacity of only 500 tonnes for pipe fabrication. To utilise this capacity, the Ministry of Industry arranged in October 1979 to transfer piping work from Tiruchi unit of BHEL to BHPV. From 1982-83 the Company also diversified into making industrial boilers which have much piping work.

7.3.4 The overall utilisation of the capacity during 1972-73 to 1983-84 ranged from 0.09 percent (1977-78) to 11.49 percent (1980-81). The tube bending machine (value : Rs. 12.22 lakhs), declared surplus in October 1975, has not yet been sold (December 1984). Four machines costing Rs. 6.88 lakhs were shifted to other work centres and the remaining machines (value : Rs. 8.05 lakhs) were found to be not inter-changeable.

Thus the Company's original estimate of demand for pre-fabricated piping turned out to be wrong and most of the capacity remained unused.

7.3.5 The Company stated (July 1983) "As prefabricated piping is mostly labour-intensive and since Indian labour is cheap, the practice has been to carry out most of the piping work at site in all the process plants.....Therefore, it is literally impossible to book any order for pre-fabricated piping except for Company's own use for oxygen plants. With a view to increase the utilisation of this shop, Company has started diversifying into boiler piping which has ultimately resulted in diversification in boiler field itself. Since no other avenues could be found to increase the utilisation of these machines..... the Company has decided to dispose of some of the machines".

Dished ends

7.3.6 As suggested by the Czesh Collaborators, the capacity set up for fabrication of dished ends was 3,000 tonnes annually, for which equipment worth Rs. 145.62 lakhs was installed. The press shop had 3 presses of 1600, 400 and 250 tonnes capacity (value : Rs. 116.45 lakhs). Of these only the 1600 tonne press was found suitable for making press parts ; on the other two presses operations such as pre-bending of plates, small pressed components, etc., were only found possible. As the rest of the machinery (value : Rs. 29.17 lakhs) was not suitable for the manufacture of dished ends, the Company in order to utilise the machines, diversified on a large scale into the manufacture of column internal in collaboration with Engineers India Limited; since 1972-73 valve trays valued at Rs. 4 lakhs were manufactured and delivered.

7.3.7 The actual utilisation of capacity set up for the dished ends during 1972-73 to 1983-84 ranged from 'nil' (1981-82) to 7.67 percent (1976-77) as BHPV did not get enough orders.

7.3.8 Of the other machines (value : Rs. 29.17 lakhs) the Company said in July 1983 "these are general purpose machines and further increase in utilising the capacity has limitations. In this field the Company has to compete with private sector sheet metal fabricators, who have special purpose machines with high productivity".

The gross under use of the capacity for fabrication of dished ends shows that the original estimate of demand was far too optimistic.

7.4 "Intensity factor"

7.4.1 The original project report of Techno Export, Czechoslovakia indicated a certain product profile and also specified the annual capacity in terms of each product by tonnage. As the product profile

tilted towards greater sophistication with the inclusion of cryogenic plants, cryogenic vessels, cold converters, multilayer vessels for ultra high processes and as the Company diversified into new fields such as continuous digestors, evaporators, (for the paper industry) deaerators (for the power sector) and industrial boilers, the Company felt that, while adding up the total production during the year the tonnages of more sophisticated products should be multiplied by an "intensity factor" as they required higher inputs of resources per tonne.

7.4.2 The "Intensity factor" has been worked out in the following manner :

(i) The Czech Collaborators' technological report indicated for the original product profile that a tonne of product needed 72.5 hours on average as per their standards, which is equivalent to 102 Indian hours (assuming that one Czech hour is equivalent to 1.4 Indian hours).

(ii) Based on its own independent studies BHPV fixed the standard hours required for each operation for the actual equipment produced in the year (i.e., the present product profile); and thus worked out the year's actual production in terms of standard hours. This divided by the actual tonnage produced during the year, gave the standard hours per tonne of actual production in that year.

(iii) This is divided by 102 to give the intensity factor i.e. this factor for each year is the ratio between the standard hours per tonne actually produced (as worked out in item ii above) and 102 hours.

7.4.3 The intensity factor for the period from 1978-79 as worked out by the Company was as follows :

Year	
1978-79	1·42
1979-80	1·78
1980-81	1·97
1981-82	1·65
1982-83	1·52
1983-84	1·89

7.4.4 The Company, however, declared the equivalent production only from 1980-81 onwards. Details of the actual production, excluding bought out components and erection, and equivalent production declared after applying intensity factor of the previous year are as under :

(In tonnes)

Year	Actual production*	Production as declared after applying intensity factor**
1	2	3
1980-81	7382	13949
1981-82	6291	13298
1982-83	7272	12930
1983-84	6530	10964

*Excluding bought out components and erection.

**The basis on which the Company has arrived at the figures of declared production is not known.

7.4.5 Since the Czech standard hours of 72.5 per tonne were fixed for the product profile consisting of low technology items, it would be necessary for the Company to make fresh studies to arrive at the standard hours applicable to the changed profile with high technology items, to make it more scientific and realistic. This was not done. As the computation of standard hours on the basis of which the intensity factor was being worked out was not done on realistic lines, the computation of equivalent production with reference to this factor and its comparison with the installed capacity cannot be considered to be realistic. This method of working out the production figures by applying the intensity factor has not been approved by the Board of Directors/Government.

7.4.6 The Ministry (February 1984) stated "Intensity factor was applied for expressing production in terms of equivalent tonnage. Since the technological content in the diversified product-mix greatly varies from product to product, no separate sanction was sought from the Board or Government for application of the intensity factor, but whenever production was reported, it was mentioned that production is given in terms of equivalent tonnage. The Company is at present working out alternative methods of expressing production".

7.4.7 When the Audit Board asked whether there was justification for applying the intensity factor in working out the production for the year and whether the basis followed by the Company to arrive at the intensity factor was scientific, the Company representatives stated (February 1984) that as the product-mix, production technologies and the types of products were changing to work out the total production and judge the Company's performance the intensity factor had to be applied. It was also stated that the method adopted in working out the intensity factor was not based on studies by the Industrial Engineers and may not be accurate. It was further stated that the calculation of intensity factor is being refined based on technology hours.

8. MANPOWER ANALYSIS

8.1 Staff strength

8.1.1 In the project report, the Collaborators recommended a total number of 2110 employees for an annual production of 23210 tonnes; direct and indirect workers were to be about 38% and 32% respectively of the total strength (i.e. in the ratio of 100 : 84).

8.1.2 The Company, however, made its own assessment of man-power requirements from time to time viz., 2568 in October 1967, 3568 in April 1973 and 4149 in June 1974 although the actual production was far below 23,210 tonne (Break-up of the total strength into direct, indirect and others was not worked out).

8.1.3 The actual number of employees engaged during 1978-79 to 1983-84 were as follows :

Category	1978-79	1979-80	1980-81	1981-82	1982-83	1983-84
Total Staff	**3,624**	**3,825**	**3,943**	**4,009**	**4,041**	**4,188**
(a) Direct workers	1,279 (35.29)	1,271 (33.23)	1,260 (31.96)	1,260 (31.43)	1,105 (27.34)	1,066 (25.45)
(b) Indirect workers	729 (20.12)	876 (22.90)	1,011 (25.64)	1,020 (25.44)	1,157 (28.63)	1,215 (29.01)
(c) Supervisors and Officers	855 (23.59)	950 (24.84)	942 (23.89)	1,092 (27.24)	1,137 (28.14)	1,178 (28.13)
(d) Others	761 (21.00)	728 (19.03)	730 (18.51)	637 (15.89)	642 (15.89)	729 (17.41)
(e) Ratio between direct and indirect workers	1:0.57	1:0.69	1:0.80	1:0.81	1:1.05	1:1.14

Note.—Figures in brackets represent percentage to total staff.

From 1979-80 onwards indirect workers increased rapidly, as the Company regularised casual labourers and categorised them as indirect workers. Again, in 1982-83, the Company diverted some direct workers to indirect jobs. Thus in 1983-84, indirect workers formed the largest of the four groups (over 29% of the total strength) and the ratio of indirect to direct workers stood at 114 : 100 as against the norm of 84:100 indicated by the Collaborators.

The number of indirect workers in excess of the norm of 84:100 during 1982-83 and 1983-84 worked out to 228 and 319 respectively. Computed with reference to the average cost per employee of Rs. 19,602 and Rs. 24,688 in 1982-83 and 1983-84, the cost of excess indirect workers engaged worked out to Rs. 44.69 lakhs and Rs. 78.75 lakhs respectively.

8.1.4 In April 1973, the Board of Directors sanctioned 1924 direct workers for achieving an annual production of 20,000 tonnes, the estimated per capita production working out to 10.40 tonnes. The details of actual production, actual direct workers in position during 1978-79 to 1983-84 and the excess workers as compared to the Company's own norms are as follows :

Year	Production		Number of direct workers required as per Company's norms	Number of direct workers	Total direct wages paid (Rs. in lakhs)	Excess	
	Total* (in tonnes)	Per direct worker				Number of direct workers	Proportionate direct wages (Rs. in lakhs)
1978-79	6117	4.78	589	1279	98.71	690	53.29
1979-80	6022	4.74	580	1271	108.87	691	59.19
1980-81	7835	6.22	754	1260	112.27	506	45.08
1981-82	6452	5.12	621	1260	128.23	639	65.03
1982-83	7438	6.73	716	1105	146.17	389	51.46
1983-84	6830	6.41	658	1066	182.99	408	70.04
							344.09

*Before applying intensity factor (Bought out items are excluded but erection is included).

It may be seen that the per capita production per direct worker was very low throughout, even as compared to the Company's own norm. For the actual production, the direct workers were much in excess of requirements worked out on the basis of this norm, the extra expenditure on this excess strength being Rs. 344.09 lakhs during these six years.

8.1.5 The Ministry stated (February 1984) "the number of direct workmen was not in excess of the assessment made in the year 1973 when production is expressed in terms of equivalent tonnage, as per table given below :

Year	Actual number of direct workers	Equivalent tonnage	Number of direct workers required as per assessment made in 1973	Excess
1980-81	1260	13949	1341	Nil
1981-82	1260	13298	1279	Nil
1982-83	1105	12910	1243	Nil"

However, the computation of intensity factor is not based on studies by Industrial engineers and may not be accurate (as discussed in para 7.4.7). As such, the "equivalent tonnages" mentioned above cannot be taken as a reliable basis.

8.2 Utilisation of labour

8.2.1 The following table gives details of utilisation of labour during the six years ended 1983-84 :

(In lakhs of hours)

	1978-79	1979-80	*1980-81	1981-82	1982-83	1983-84
(i) Total available hours	33.71	33.05	15.68	27.21	26.91	26.95
(ii) Absentee hours	6.35	5.87	2.19	3.83	3.85	3.80
(iii) Percentage of (ii) to (i)	18.84	17.76	13.97	14.08	14.31	14.10
(iv) Net hours available for utilisation	27.36	27.18	13.49	23.38	23.06	23.15
(v) Hours booked against jobs	25.93	23.37	9.80	13.91	16.01	16.57
(vi) Idle hours	1.25	2.97	3.35	9.26	6.82	6.29
(vii) Hours not accounted	0.18	0.84	0.34	0.21	0.23	0.29
(viii) (a) Percentage of hours booked to jobs to net hours available	94.77	85.98	72.65	59.50	69.43	71.58
(b) Idle hours to net hours available	4.57	10.93	24.83	39.60	29.58	27.17
(c) Hours not accounted to net hours available	0.66	3.09	2.52	0.90	0.99	1.25

*Represents figures from September 1980 to March 1981.

It may be seen that the percentage of idle hours to net hours available has increased from 1980-81.

8.2.2 The following are the shop-wise details of available hours and idle hours for the period from 1978-79 to 1983-84 :

(Hours in Lakhs)

Shop	1978-79			1979-80			1980-81			1981-82			1982-83			1983--84		
	Avail-able hours	Idle hours	% of idle hours to available hours	Avail-able hours	Idle hours	% of idle hours to available hours	Avail-able hours	Idle hours	% of idle hours to available hours	Avail-able hours	Idle hours	% of idle hours to available hours	Avail-able hours	Idle hours	% of idle hours to available hours	Avail-able hours	Idle hours	% of idle hours to available hours
Light machine shop	5.98	0.18	3.01	4.45	0.47	10.56	2.31	0.88	38.10	4.13	1.79	43.34	3.93	1.73	44.02	3.82		40.84
Material preparation	1.68	0.09	5.36	1.55	0.10	6.45	0.70	0.12	17.14	1.12	0.33	29.46	1.22	0.31	25.41	1.36	0.	22.79
Shells	3.77	0.25	6.63	3.21	0.41	12.77	1.65	0.45	27.27	2.80	0.97	34.64	2.71	0.63	23.25	2.90	0.54	18.62
Heavy machine shop	1.02	0.09	8.82	1.00	0.14	14.00	0.59	0.15	25.42	0.87	0.27	31.03	0.71	0.17	23.94	0.71	0.13	18.31
Boiler piping shop	0.08	..	..	0.45	0.08	17.78	0.27	0.03	11.11	1.06	0.17	16.04	1.21	0.20	16.53	1.19	0.17	14.29
Press shop	4.49	0.06	1.34	3.88	0.17	4.38	1.91	0.17	8.90	2.55	0.64	25.10	2.54	0.54	21.26	2.54	0.55	21.65
Tool room and tool manufacturing shop	1.69	0.03	1.78	1.47	0.06	4.08	0.74	0.19	25.68	1.30	0.43	33.08	1.25	0.50	40.00	1.21	0.49	40.50
Pressure vessels	6.75	0.16	2.37	6.11	0.16	2.62	3.14	0.39	12.42	5.45	1.98	36.33	5.91	0.99	16.75	5.92	1.18	19.93
Heat exchangers	4.58	0.23	5.03	4.20	0.65	15.48	1.98	0.44	22.22	3.88	1.41	36.34	3.59	1.11	30.92	3.80	0.84	22.11
Cryogenics	3.67	0.16	4.36	3.02	0.26	8.61	1.44	0.26	18.06	2.65	0.73	27.55	2.75	0.38	13.82	2.52	0.26	10.32
Welding technology	..	..	..	0.90	0.03	3.33	0.37	0.05	13.51	0.57	0.17	29.82	0.31	0.01	3.23	0.28	0.01	3.57
Nozzle fabrication	..	..	..	..	..	..	0.27	0.11	40.74	0.47	0.22	40.81	0.43	0.18	41.86	0.48	0.18	37.50
Exhaust manifold section	..	..	..	..	..	..	0.31	0.11	35.48	0.36	0.15	41.67	0.35	0.07	20.00	0.22	0.07	31.82

Note— (1) For the year 1979-80, the shop-wise details were not available in certain shops (cryogenics, welding technology, etc.) for the period from April to September, 1979.

(2) The figures for 1980-81 were for the period from September, 1980 to March, 1981.

In certain shops (viz., light machine shop, tool room, nozzle fabrication, etc.) the figures show high percentage of idle labour. The Company stated (September 1983) that BHPV being a specialised fabrication organisation doing only job work, continuity of work as in the case of process industry was not possible and the non-availability of special material, consumables, clarifications on drawings, etc., contributed to such idle time ; and that it is proposed to streamline the existing systems to enable better control.

8.3 Analysis of idle-hours

8.3.1 The following table gives a broad break-up of idle hours for the six years ended 31-3-1984 :

(In lakh hours)

	1978-79	1979-80	1980-81@	1981-82	1982-83	1983-84
A. Unavoidable* idle hours	0.08	0.06	0.04	0.05	0.09	0.09
Percentage to total idle hours	6.40	2.02	1.19	0.54	1.32	1.43
B. Avoidable idle hours						
(i) Want of work, tools, etc.						
(a) Total hours	0.54	2.34	3.03	8.60	5.97	4.85
(b) Percentage to total idle hours	43.20	78.79	90.45	92.87	87.54	77.11
(ii) Want of crane/material handling equipment						
(a) Total hours	0.11	0.13	0.07	0.09	0.17	0.35
(b) Percentage to total idle hours	8.80	4.38	2.09	0.97	2.49	5.56
(iii) Administrative reasons						
(a) Total hours	0.05	0.05	0.06	0.09	0.08	0.10
(b) Percentage to total idle hours	4.00	1.68	1.79	0.97	1.17	1.59
(iv) Miscellaneous						
(a) Total hours	0.47	0.39	0.15	0.43	0.51	0.90
(b) Percentage to total idle hours	37.60	13.13	4.48	4.65	7.48	14.31
(v) Cost of avoidable idle hours (Rupees in lakhs)	4.57	11.49	15.02	63.00	46.71**	47.51**

@1980-81 figures are from September 1980 to March 1981

*Time lost due to machine break-down and power failure has been reckoned as unavoidable.

**This has been computed in Audit, as the Company discontinued computation of labour hour rate during 1982-83 and 1983-84. [and switched over to machine-hour rate.

8.3.2 A detailed cause-wise analysis of idle hours for the years 1980-81 to 1983-84 is given below :

(Number of hours)

Cause	1980-81@	1981-82	1982-83	1983-84
Waiting for	2,92,953	8,42,693	5,88,637	4,75,409
Work	2,166	3,384	2,362	2,893
Tools	7,226	12,246	1,743	4,863
Materials and consumables	180	439	171	242
Instructions	166	373	139	253
Technical clarifications	254	218	3,305	788
Design/drawing clarifications	218	567	951	755
Inspection/Inspector				
Total	**3,03,163**	**8,59,920**	**5,97,308**	**4,85,203**
Waiting due to	3,065	4,848	7,611	8,541
Machine break-down	316	887	245	345
Preventive maintenance	732	241	1,812	833
Power failure	6,918	9,107	16,737	34,930
Want of crane/material handling equipment	196	389	75	126
Operator away for personal reasons	1,571	880	804	808
Operator idle because there is no machine				
Time lost due to	4,860	8,528	7,242	9,447
Late coming/early going	3,470	4,101	3,237	2,468
Salaries/coupons, etc.	11	..	16	156
Overlapping of shifts	3,649	6,058	7,709	10,053
Waiting for completion of previous job	7,463	31,194	39,534	75,971
Unspecified idle time				
Total	**13,35,414**	**9,26,153**	**6,82,330**	**6,28,881**

@Represents figures from September 1980 to March 1981.

It may be seen that large number of hours lost was due to waiting for work, etc.,—3.03 lakhs hours in 1980-81, 8.60 lakhs hours in 1981-82, 5.97 lakhs hours in 1982-83, and 4.85 lakhs hours in 1983-84.

8.3.3 The Company told the Audit Board (February 1984) that the loss of man hours due to want of work was not due to insufficient orders but due to non-availability of certain facilities for balanced working; and that the constraints have been identified and by providing marginal facilities, labour could be utilised fully.

Regarding idleness arising from lack of material handling facilities, it was stated that in the existing lay-out of the factory, providing of additional cranes would cause more problems and constraints; the factory requires re-lay-out, which is under consideration, and once this is done, additional material handling facilities could be provided and idleness of labour on this account could be substantially reduced.

8.4 Production incentive scheme

8.4.1 To improve productivity, the Company introduced in 1979 a production incentive scheme, its main features being :

(i) Out of the 200 available man-hours per employee per shift per month, an average of 150 productive standard man-hours (PSMH) was expected at normal pace. The scheme was to reward workers who achieved a minimum of 70 PSMH upto a maximum of 250 PSMH per month with an incentive payment ranging from Rs. 42 to Rs. 220 per month on slab basis as under :

PSMH range	Rate per PSMH
0—69	Nil
70—	Re. 0·60
71—80	Re. 0·80
81 and above	Re. 1·00

(ii) All the indirect workers were to be paid at 60% of the average *per capita* earnings of the direct employee group to which they were attached and rendering the services.

(iii) The actual amount paid was to be in proportion to the attendance and if an employee remained unauthorisedly absent he was to forfeit his right of earning incentive.

(iv) If an employee worked over-time, there was to be corresponding reduction in the incentive amount on the basis of a specified formula.

8.4.2 When the Audit Board asked why the minimum eligibility base for payment of incentive was fixed as low as 70 PSMH against 200 available man hours and 150 PSMH expected normally the Company stated (February 1984) that the minimum of 70 PSMH was fixed in May 1979 taking into account the average of about 60 PSMH obtaining at that time, to induce the workers to try for higher production. Though the PSMH discharged by the workers currently are more, it would be difficult for the Company to increase the minimum as it would be resisted by the workers. The Company added that they were, however, gradually tightening up the standards with the introduction of higher technology so that the desired effect of raising the present PSMH for paying incentives is automatically reached.

8.4.3 The table below gives the standard hours available, standard hours produced, production incentive paid, etc., during 1978-79 to 1983-84 :

Year	Number of direct workers	Capacity in terms of SMH for the year (hours in lakhs)	Actual standard hours produced (hours in lakhs)	Percentage of actual hours achieved to available standard hours	Production incentive paid during the year (Rupees in lakhs)
1978-79	1279	23·02	9·41	40·88	..
1979-80	1271	22·88	10·96	47·90	4·97
1980-81	1260	22·68	14·81	65·30	14·05
1981-82	1260	22·68	11·82	52·12	10·59
1982-83	1105	19·89	12·79	64·30	11·22
1983-84	1066	19·19	12·57	65·50	11·22

Though the total SMH produced was rising upto 1980-81, it declined thereafter upto 1982-83 inspite of payment of substantial amounts as incentive.

8.4.4 The Company anticipated that, after the introduction of incentive scheme, the output would progressively increase from 7,700 tonnes in 1979-80 to 12,800 tonnes in 1983-84. This did not happen. The actual output in 1983-84 was only 7,568 tonnes.

The details of the anticipated as well as actual output, idleness of men and machines vis-a-vis the incentive amounts paid during the five years ended 1983-84 were as follows :

Year	Anticipated output (in tonnes)	Actual output	Percentage of idle		Incentive paid (Rupees in lakhs)
			man hours *	machine hours	
1979-80 . . .	7,700	6066	10·93	42·99	4·97
1980-81 . . .	9,000	8196	24·83*	64·19*	14·05
1981-82 . . .	10,300	7006	39·60	68·25	10·59
1982-83 . . .	11,600	8222	29·58	70·65	11·22
1983-84 . . .	12,800	7568	27·17	68·35	11·22

*During September 1980 to March 1981.

The figures show that even after the incentive scheme was started, the anticipated level of output was not achieved, but the idle hours of men and machines had increased substantially.

8.4.5 The Company stated (September 1983) "The standard hours achieved are improving gradually mainly with the introduction of incentive scheme from 1979-80 and also due to the changes in the product-mix involving more sophisticated jobs. Based on this experience, the standards are being reviewed. Further, after the introduction of this incentive scheme, direct workers on a particular job are reduced and they are being diverted to other jobs or they are being trained for taking up new schemes".

The Ministry stated (February 1984) "With the introduction of productivity linked incentive scheme from the year 1979-80 onwards, absenteeism has been reduced to around 14% as against 18.84% in 1978-79. The actual standard hours achieved by these direct workmen has also considerably improved. Although the Company has taken up diversification schemes, the number of direct workmen has not been increased".

8.5 Welder's allowance

8.5.1 To induce welders to higher productivity the Company introduced (April 1973) a scheme of welder's allowance. Its main features were :

(i) Payment of allowance per month at the rate of Rs. 30, Rs. 60, Rs. 90 and Rs. 130 to Grades IV, III, II and I welders respectively.

(ii) The minimum productivity to be achieved for Grades III, II and I was to be 50%, 70%, 90% respectively, to be computed on the basis of standard time indicated by the Czech Collaborators for different types of work with a tolerance of 5%.

(iii) Grade IV welders need only to possess a certificate under the Indian Boiler Regulations or Lloyds to become eligible for the allowance.

(iv) The allowance was essentially for productivity achieved and maintained for a period of six months. It was liable to be withdrawn if the productivity fell below the minimum level laid down for each grade of welders.

8.5.2 The Company paid Rs. 29.43 lakhs as welder's allowance during 1973-74 to 1983-84. A review showed that :

(i) The scheme pre-supposed (a) the fixation of standards and (b) measurement of productivity actually achieved. The Board of Directors cautioned (April 1973) that a reliable system for maintaining the records of productivity should be instituted and carefully followed. The Company neither fixed standards for productivity nor maintained records to measure the actual productivity of welders. The allowance was paid at the rates applicable to each grade without linking it to productivity.

(ii) A study team was formed in June 1974 with the Assistant Works Manager as Chairman to evolve standard data for measuring the productivity of welders. But so far no system or procedure has been evolved.

(iii) Though the allowance is a productivity linked incentive, it has been treated as pay for purposes of payment of overtime and leave salary, resulting in extra expenditure of Rs. 1.23 lakhs in the period July 1978 to March 1982. (Details of amount paid during May 1973 to June 1978 are not available).

(iv) The Company had entered into an agreement with the employees' union (July 1973) for payment of welders' allowance as per the approved scheme to be effective for a period of 5 years from 1st May 1973. Though the agreement expired on 30th April 1978, the payment of allowance has been continued.

8.5.3 The Company did not report on the working of the scheme to the Board of Directors till July 1980, when a proposal was made to continue paying welders' allowance at the same rates and to ratify the payments already made. The Board was informed that although the agreement had expired on 30th April 1978 (i.e. about 2 years earlier), payment was continued as the workers would not agree to lose any benefit which they were enjoying. Under these circumstances, the Board approved the continuance.

8.5.4 The Company said in February 1982 that the implementation of the scheme as originally approved by the Board involved heavy documentation and maintenance of records which was found to be not practicable. Thus, the Company took up the scheme involving sizeable financial commitments, without examining the full implications and without conceiving a proper system/procedure for implementing the same.

9. MACHINE UTILISATION

9.1 In the Project Report (July 1965) the machinery needed was assessed for an annual production of 23210 tonnes of the product-mix then envisaged. The product-mix was changed from time to time as assessments of demand changed and balancing equipment was added to meet the changed requirements. The value of plant, machinery and equipment installed upto 31-3-1984 was Rs. 1881.83 lakhs.

9.2 The Company does not prepare any forecast indicating the extent to which the annual production programme will load the machines/machine centres so as to find out which machines/machine centres are critical or likely to be critical and which will have surplus capacity (for which plans for profitable utilisation can be made).

9.3 Utilisation of machines

9.3.1 Statistics of machine utilisation for major groups of machinery were compiled only from 1976-77. The following table shows the overall utilisation and idle time of machinery for the 6 years from 1978-79 to 1983-84 :

Year	Available hours (including time required for maintenance)	Utilised hours	Percentage of utilisation to available hours	Idle hours	Percentage of idle hours to available hours
1978-79	6,83,379	4,25,752	62·30	2,57,627	37·70
1979-80	6,98,777	3,98,393	57·01	3,00,384	42·99
1980-81*	4,84,746	1,73,581	35·81	3,11,165	64·19
1981-82	8,39,088	2,66,390	31·75	5,72,690	68·25
1982-83	8,35,089	2,45,072	29·35	5,90,017	70·65
1983-84	8,64,128	2,73,536	31·65	5,90.592	68·35

*For the period from September 1980 to March 1981.

Available hours varied from year to year with changes in the number of working days, inclusion of certain machines in the utilisation statistics for the first time and additions to machinery. The percentage of idle hours to available hours has increased rapidly from 37.70 in 1978-79 to 70.65 in 1982-83 and 68.35 in 1983-84. It has been as high as 60-70% in the last 4 years.

9.3.2 The details of groupwise utilisation of machines (major groups) for the years 1978-79 to 1983-84 are as follows :

	Lathes	Milling machines	Drilling machines	Vertical turning and boring machines	Horizontal boring machines	Plate bending rolls	Planing machines	1600T press	Other presses	Plasma cutting machines
	1	2	3	4	5	6	7	8	9	10
1978-79										
(a) Available hours	149250	58001	185610	53409	25007	34384	23080	5011	53948	10509
(b) (i) Utilised hours	111872	43430	119138	45352	21896	9762	16108	4543	20997	7527
(ii) Percentage to available hours	74·96	74·88	64·19	84·91	87·56	28·39	69·79	90·66	38·92	71·63
(c) (i) Idle hours	37378	14571	66472	8057	3111	24622	6972	468	32951	2982
(ii) Percentage to available hours	25·04	25·12	35·81	15·09	12·44	71·61	30·21	9·34	61·08	28·37
1979-80										
(a) Available hours	158330	70186	175290	48060	20906	33750	23164	4860	46748	10144
(b) (i) Utilised hours	113892	42595	97977	35391	17176	15134	15430	4367	18126	7612
(ii) Percentage to available hours	71·94	60·69	55·89	73·64	82·16	44·84	66·61	89·86	38·78	75·04
(c) (i) Idle hours	44438	27591	77313	12669	3730	18616	7734	493	28622	2532
(ii) Percentage to available hours	28·06	39·31	44·11	26·36	17·84	55·16	33·39	10·14	61·22	24·96
1980-81*										
(a) Available hours	92928	30976	98560	28160	14080	17280	14080	2816	36608	5632
(b) (i) Utilised hours	43818	13360	26210	14692	9139	4661	3963	1956	20987	2138
(ii) Percentage to available hours	47·15	43·13	26·59	52·17	64·91	26·97	28·15	69·46	57·33	37·96

*From September 1980 to March 1981.

	1	2	3	4	5	6	7	8	9	10
(c) (i) Idle hours	49110	17616	72350	13468	4941	12619	10117	860	15621	3494
(ii) Percentage to available hours	52·85	56·87	73·41	47·83	35·09	73·03	71·85	30·54	42·67	62·04
1981-82										
(a) Available hours	159983	53328	169680	48480	24240	33936	24240	4848	58176	10080
(b) (i) Utilised hours	52551	17803	49030	19690	16233	8081	11151	4183	20469	1959
(ii) Percentage to available hours	32·85	33·38	28·90	40·61	66·97	23·81	46·00	86·28	35·18	19·43
(c) (i) Idle hours	107432	35525	120650	28790	8007	25855	13089	665	37707	8121
(ii) Percentage to available hours	67·15	66·62	71·10	59·39	33·03	76·19	54·00	13·72	64·82	80·57
1982-83										
(a) Available hours	158928	52976	168560	48160	24080	33712	24080	4816	57792	9632
(b) (i) Utilised hours	58406	16272	46135	24067	15739	8731	11232	5256	9356	3947
(ii) Percentage to available hours	36·75	30·72	27·37	49·97	65·36	25·90	46·64	100·00	16·19	40·98
(c) (i) Idle hours	100522	36704	122425	24093	8341	24981	12848	..	48436	5685
(ii) Percentage to available hours	63·25	69·28	72·63	50·03	34·64	74·10	53·36	..	83·81	59·02
1983-84										
(a) Available hours	165792	55266	170816	50240	25120	30144	25120	5024	60288	20096
(b) (i) Utilised hours	53017	14624	47466	26290	16153	10137	10117	4935	19207	8764
(ii) Percentage to available hours	31·98	26·46	27·79	52·33	64·30	33·63	40·27	98·23	31·86	43·61
(c) (i) Idle hours	112775	40642	123350	23950	8967	20007	15003	89	41081	11332
(ii) Percentage to available hours	68·02	73·54	72·21	47·67	35·70	66·37	59·73	1·77	68·14	56·39

9.3.3 Except the horizontal boring machines and the 1600 tonne press, all machine groups were utilised less than 50% during 1980-81 to 1983-84 (except in the case of vertical turning and boring machines in 1980-81 and 1983-84). The Company said (November, 1982) that this low utilisation was because :

- order book position was low ;
- materials were not received in time; and
- actual product-mix was widely different from the one assumed in the original project report.

9.3.4 When the Audit Board asked why percentage of idleness of presses was so high, the Company representative said (February, 1984) that "a proposal is under consideration to supply dished ends to Algeria and other (Indian) parties and if this materialises, the utilisation of machines in the press shop would considerably improve".

9.4 Cause-wise analysis of idle time was prepared only for 1978-79 and 1979-80. This is given below :

Year	Total idle hours	Want of operator		Want of work		Mechanical breakdown		Want of crane/ materials handling equipment		Other reasons	
		Hours	Percentage to total	Hours	Percentage to total	Hours	Percentage to total	Hours	Percentage to total	Hours	Percentage to total
1978-79	257627	60769	23·59	160592	62·34	5157	2·00	1152	0·45	29957	11·62
1979-80	300384	91116	30·32	181826	60·51	8678	2·89	2800	0·93	15964	5·35

The machines were idle mainly because the work was not available (over 60%) or operators were not available (30% in 1979-80). The cost of idle time, worked out by the Company on machine hour rates, was Rs. 175.52 lakhs and Rs. 211.56 lakhs in 1978-79 and 1979-80 respectively.

According to the Company, cause-wise analysis of idle hours was not prepared for other years due to the practical difficulties and that the reasons for idle time of direct labour apply equally to idleness of machines.

9.5 The utilisation of high cost and low-cost machines shown separately, for 1981-82 and 1982-83 as given by the Company are as follows :

	High cost machines (valuing more than Rs. 5 lakhs each)		Low cost machine (valuing less than Rs. 5 lakhs each)	
	1981-82	1982-83	1981-82	1982-83
Nil Utilisation	1(1)	2(2)	5(7)	8(10)
Sparingly used (Utilisation less than 15%) . . .	2(3)	nil	11(25)	11(37)
Utilisation between 15% to 60%	6(10)	11(18)	24(104)	19(86)
Utilisation above 60%	8(12)	4(6)	1(2)	3(5)
	17(26)	17(26)	41(138)	41(138)

(Figures in brackets represent number of machines and outside the bracket the number of machine groups)

The Company said (September, 1983) "Of the 26 high value machines (each costing over Rs. 5 lakhs), only one Electro-Slag Welding machine (value : Rs. 5.69 lakhs) has not at all been utilised during the last two years. This machine is useful for welding thicker plate material and is a critical one for accepting more sophisticated and heavier jobs. It is necessary to retain this machine. Of the low cost items, 5 categories of machines (7 machines) were not at all utilised in the year 1981-82 and 8 categories (consisting of 10 machines) were not utilised during 1982-83. These machines are : Column Drilling Miller Cutter, Thread Roller, Power Hammer, Section Bender, Plasma Cutter, Submerged Arc Welder and Plate Bender. They cannot be discarded since they would still be useful. Since these are required for specific jobs only, their utilisation would never be full".

10. RESEARCH AND DEVELOPMENT

10.1 One of the Company's objectives is "to strive for greater self-reliance through import substitution by research and development".

The Company started a research and development (R & D) wing in 1975.

10.2 R&D Projects taken up

10.2.1 The Company prepared its first project report on proposed R & D efforts in 1976-79 duly classified under cryogenic engineering, process technology, chemical engineering, equipment development, welding engineering development, manufacturing technology development and engineering.

Government sanctioned the project in December 1976 and released Rs. 70.47 lakhs by way of equity (Rs. 22.59 lakhs) and loans (Rs. 47.88 lakhs). The Company took up 48 projects and by end of March 1980, thirty-two projects were complete and 16 in progress. Out of Rs. 70.47 lakhs released by the Government, Rs. 27.10 lakhs was spent on capital account and Rs. 43.37 lakhs on revenue account.

10.2.2 In March 1980 BHPV prepared a second project report covering 1980 to 1983 and proposing to take up 31 new projects, and complete the 16 spill-over projects, all at an estimated cost of Rs. 117.72 lakhs. This was approved by Government in September 1981.

Upto the end of March 1983, Rs. 112.28 lakhs were spent (Rs. 45.18 lakhs on capital account and Rs. 67.10 lakhs on revenue account). By 31-3-1983 all the 16 spill-over projects and 19 of the 31 new projects were complete and 12 were in progress.

10.2.3 The Company prepared (June 1984) a draft plan covering 1983-84 and 1984-85. The uncompleted projects are in progress.

10.2.4 Since the projects taken up by the Company are mainly to meet its own needs, no links have been established with any other research institution except for use of facilities not available with the Company.

10.3 The Company claimed in a brief (prepared in October 1983) that its R & D had achieved the following :

(i) Apart from effective contribution in bridging the technological gaps, the division has been making efforts for continuous indigenisation and for development of new products and systems.

(ii) Presently the R & D is dealing with the manufacture of titanium anodes for caustic soda industry and cryobiological containers for dairy industry.

(iii) Certain products viz., super insulated piping and tanks, quick freezing units, L.N. 2 tanks, titanium heat exchangers/columns/vessels, etc., are poised for release for commercial exploitation.

10.4 The Company's project reports described the benefits that would accrue in the way of import substitution, improvement in technology, etc., but did not quantify them in monetary terms. The Company does not regularly evaluate and quantify the actual benefits from completed R & D projects.

11. SALES PERFORMANCE AND CREDIT CONTROL

11.1 Pricing Policy

11.1.1 In August 1974, the Board of Directors approved a price estimation manual. But in practice, the Company quoted prices (keeping in view the delivery periods and the prices of its competitors) which were considered reasonable and acceptable to the customers. The critical order book position and severe competition from Indian and foreign competitors often forced the Company to accept very difficult commercial terms and prices with little or no margin. In certain cases quotations at marginal cost were also submitted to public sector undertakings. The Company stated (January 1982) that the policy of marginal costing was continued to improve the order position as less new projects were coming up.

Competitiveness of quotations

11.1.2 During 1971-72 to 1983-84, the Company submitted quotations for a total value of Rs. 1057.84 crores out of which it got orders for a total value of Rs. 520 crores i.e. 49 per cent. Most of the tenders were for the public sector which, as per Government policy, gave 10% price preference to the Company.

The Company said (July 1983) that though public sector undertakings are given price preference of 10% over the lowest acceptable tender, some of the orders have to be declined as the prices offered were low and would result in losses; other reasons given for not obtaining more orders were :

- The prices offered by foreign tenderers are sometimes artificially lower.
- The prices offered by private sector undertakings with low overheads.
- Prices are offered by large private sector undertakings to gain entry into the market.
- Logistic reasons like transport of equipment.

11.1.3 From August 1969 to July 1977 detailed reports were put up to the Board on each quotation of Rs. 20 lakhs and above, the orders received and the reasons for rejection. The main reasons given by the Company for losing orders were : high rates quoted, unsuitable delivery schedules and delay by customers in taking decisions and placing orders.

In April 1975, the Board had observed that since a number of orders were lost on account of non-competitive prices or unduly long delivery periods, all efforts should be made to improve delivery periods. An analysis of 30 high-value rejected tenders submitted by BHPV during the subsequent period 1980-81 to 1982-83, however, showed that most of the tenders were still being rejected due to either non-competitive prices quoted or long delivery periods.

The Company stated in July 1983 that by taking forward action like engineering work, etc, it has been able to reduce its price and has been offering 14 months' deliveries; deliveries less than 14 months are found to be practically not possible due to the constraints of raw material availability in the Indian market.

Orders secured against international tenders

11.1.4 One of BHPV's objectives is to produce equipment at a cost not more than that of imported equipment so that it can sell equipment at competitive prices in the domestic market and, in due course, abroad. The table below shows the total of value of BHPV's quotations and the orders secured by BHPV against international tenders during 1975-76 to 1983-84 :

(Rupees in lakhs)

	Normal equipment (pressure vessels, heat exchangers, etc.)	Air and Gas separation plants, Oxygen plants, etc.
(i) Orders for direct export :		
Quotations submitted . . .	1152	1014
Orders received . . .	Nil	100
Percentage of orders secured	Nil	9·86
(ii) Orders against global tenders for projects in India under World Bank (IDA) credit :		
Quotations submitted . .	2197	1049
Orders received . . .	1084	Nil
Percentage of orders secured	49·34	Nil

The BHPV could not get any orders for direct export of normal equipment; nor for supply of Air and Gas separation plants against global tenders for Indian projects under IDA credit. In the latter group, though 15% price preference is given over the c.i.f. price of foreign tenders, BHPV could get orders totalling only 49.34% of the value of the quotations given. This was again due to high rates and longer delivery periods quoted by the Company.

The Company feels, however, that (July 1983) "The percentage of orders secured by BHPV under World Bank procedure is considered to be good for the following reasons :

— 15% price preference is available to all Indian companies and not to BHPV alone.

— There is no further purchase or price preference given to BHPV even if the buyer is an Indian Government Company".

11.2 Sales performance

11.2.1 Pending orders.—At the end of March 1984, orders totalling Rs. 21,186.64 lakhs remain pending. The year-wise break-up is :

Year	Amount (Rupees in lakhs)
1978-79 . . .	14·93
1979-80 . . .	0·75
1980-81 . . .	296·94
1981-82 . . .	582·93
1982-83 . . .	14256·12
1983-84 . . .	6034·97
Total .	21186·64

11.2.2 Loss in the execution of orders.—Out of 1739 orders met upto 1983-84, the Company had losses in 891 cases, i.e. on 51% of the orders. An analysis of 16 cases of substantial losses showed this :

Customer	Equipment supplied	Amount of loss (Rs. in lakhs)	Points noticed
(1)	(2)	(3)	(4)
1. Bongaigaon Refineries and Petro-Chemicals Limited (Sale order No. 153)	Air Cooled Heat Exchangers (Contract value : Rs. 68·87 lakhs)	50·45	— Revision of drawings, change of specifications and late receipt of structural details from the customer created bottle necks. — The Company did not analyse the reasons for abnormal variance between actual costs and estimates and contended that it had given them valuable experience in this line of manufacture.
2. Bongaigaon Refineries and Petro-Chemicals Limited (Sale order No. 132)	Delayed coker unit columns and vessels (Contract value : Rs. 19·60 lakhs)	27·31	— The Company quoted Rs. 27·41 lakhs which was itself an unrealistic estimation. The contract was finally accepted for Rs. 19·60 lakhs after negotiations.
3. Indian Oil Corporation Limited (Mathura Refinery Project) (Sale order No. 126)	Storage spheres (Contract value : Rs. 90·44 lakhs)	41·88	— The Company quoted a low price though its Finance Wing advised about possible loss at that price.
4. Indian Oil Corporation Limited (Mathura Refinery Project) (Sale Order No. 125)	Air cooled Heat Exchangers (Contract value : Rs. 60·41 lakhs)	34·23	— The Company did not examine the adequacy of the technical know-how available with them before accepting the order and had to develop the technology at sizeable cost.
5. Indian Oil Corporation Limited (Mathura Refinery Project) (Sale order No. 127)	Heat exchangers (Contract value : Rs. 26·43 lakhs)	29·58	— The Company did not analyse the reasons for wide variations between the price quoted and expenditure incurred.
6. Indian Oil Corporation Limited (Mathura Refinery Project) (Sale order No. 183)	Valve trays (Contract value : Rs. 9·25 lakhs)	11·06	— The Company reduced the originally quoted price of Rs. 16·24 lakhs to Rs. 9·25 lakhs to meet with competition. Even on the basis of the original quotation, it would have incurred a loss of Rs. 4·07 lakhs.
7. Indian Oil Corporation Limited (Mathura Refinery Project) (Sale order No. 76)	Stainless Steel clad column (Contract value : Rs. 16·86 lakhs)	12·50	— The Company accepted an additional stipulation to limit the variation of hardness of weld joints to 50 VPN as measured at the parent metal, the heat affected zone and the weld metal, which was beyond the scope of original order. In order to meet this limitation the Company conducted stress relieving at 720°C instead of at 650°C. As the hardness of the base material supplied by the customer could not stand this high temperature, the equipment got distorted. The Company carried out rectification work at a cost of Rs. 14·99 lakhs. — The Company did not make sure of the hardness of the base material supplied by the customer, before stress relieving at high temperature. — While accepting the additional stipulation the Company did not mention the financial terms and, therefore, could not claim escalation for the additional expenditure. — The Company also accepted to establish welding procedure in the preferred range of 630°C—690°C in the absence of tempering temperature of the plate supplied by the customer and to use E. 309L electrodes with 0·05% carbon as maximum. As there were additional requirements of the customer the Company claimed Rs. 2·50 lakhs extra but did not press the claim and finally abandoned it. — The Company considered the loss as development cost.

(1)	(2)	(3)	(4)
8. Indian Oil Corporation Limited (Sale order No. 220)	LPG Sphears (Contract value : Rs. 40·98 lakhs)	37·25	— The Company reduced the price quoted to meet competition. — Progress of expenditure was not monitored during the execution of the work. — The Company preferred extra claims for Rs. 24·90 lakhs which were finally settled at Rs. 5·40 lakhs.
9. Fertilizer Corporation of India Limited (Sale Order Nos. 491—01/4 and 02)	Urea reactor, Ammonia reactor, first stage separator (Contract value : Rs. 47·56 lakhs)	41·42	— The Company did not make any provision for development costs or cost escalation in the contract, which was accepted on the basis of landed cost for the equipment. — The order for 'first stage reactor' was got cancelled as the Collaborators themselves were not hopeful of successfully executing it. By the time the decision to cancel the order was taken, the Company procured material valued at Rs. 65,000, of which material value at Rs. 45,784 had to be discarded. — The equipment was taken up for manufacture for the first time in the country. — There was delay of one/two years in the supply of urea/Ammonia reactors (for which Rs. 2·42 lakhs was paid as penalty). — For sorting out technical problems arising in the course of manufacture, the Company spent Rs. 1·99 lakhs in deputing its engineers to Collaborator's works and for the visit/stay of Collaborator's engineers in India. — As a result of delay in supply FCI had to import a Urea reactor. — The order was accepted even before the Company absorbed the Collaborator's technology.
10. Fertilizer Corporation of India Limited (Sale order No. 727 i & ii)	Distiller (Contract value : Rs. 16·89 lakhs)	33·83	— The Company quoted a delivery period of 18—20 months from the date of placement of order or 12 months after receipt of free issue of material from the customer whichever was later. — The customer accepted only the delivery of 18—20 months from date of placement of order and insisted on completion by February 1976, though they completed free issue of materials by November 1975 only. — The work was completed by March 1978 and the customer withheld Rs. 1·02 lakhs due to delayed supplies.
11. Fertilizer Corporatio of India Limited (Sale order No. 173)	LT and HT convertors (Contract value : Rs. 20·20 lakhs)	29·89	— The prices originally quoted were reduced to match with competitive offers. — The delivery agreed was 14 months after receipt of order or 8 months after receipt of free issue of material whichever was later. The free issue of material, to be received by June 1978 was actually received by May 1979. — The liquidated damages clause was applicable inspite of the delay in free issue of materials. — The materials supplied by the customer were found defective. The defective materials led to additional expenditure of Rs 9·47 lakhs by way of non-destructive tests, but the customer paid only Rs 5·59 lakhs. — The Company put forth claims for extra expenses on account of increase in wages, LPG, cost of electrodes, power, etc, and overtime charges (Rs. 5·16 lakhs) but withdrew the same.
12. Heavy Electricals Limited, Bhopal (Sale order No. 429)	Reheater Shells and Internals (Contract value : Rs. 30·73 lakhs)	57·95	— Free issue of materials to be received by Company in March 1974 for internals and June 1975 for reheaters, were received late with the result the equipment scheduled for delivery in April 1976 was actually supplied during May 1977 to May 1978. There was no protective clause against delays in supply of materials by customer and consequent escalation in costs. Rs. 1·71 lakhs withheld by the customer was yet to be received by Company.
13. Bharat Heavy Electricals Limited, Hyderabad (Sale order Nos. 236 and 378)	Deaerators (Contract value : Rs. 22·87 lakhs)	27·05	— The Company received the order for one deaerator in June 1977 and quoted the same price for supply of another deaerator in June 1978 and lost Rs. 8·51 lakhs in executing the same. — On another order received against enquiry in October 1978 for 3 deaerators the Company lost Rs. 18·54 lakhs. — The Company did not gain by experience on earlier orders while quoting lower prices.

(1)	(2)	(3)	(4)
14. Diesel Locomotive Works, Varanasi (Sale order No. 159, 353)	Exhaust Manifolds (Contract value : Rs. 101·42 lakhs)	55·30	— As against a profit of Rs. 5·50 lakhs expected in the manufacture and supply of 100 exhaust manifolds, the Company incurred a loss of Rs. 36·45 lakhs. The unit price received was Rs. 41,900. — Notwithstanding the fact that the Company lost heavily in executing earlier order, they accepted a second order for supply at Rs. 42,500 per unit, and lost Rs. 18·85 lakhs in the supply of 142 units. — Though the product was developed only for Railways, the Company did not attempt to pass on the development costs to them.
15. Department of Atomic Energy, Bombay (Sale order No. 361)	Fuelling machine access doors (Contract value : Rs. 11·41 lakhs)	30·52	— The Company took up the job, which was considered very critical and spent a lot of time and money in establishing procedures and faced many problems. The price obtained was uneconomical. — Rs. 0·61 lakh was spent on procurement of materials though it was the customer's responsibility to supply the same.
16. Defence Research and Development Laboratories, Hyderabad (Sale order No. 760)	Booster motors (Contract value : Rs. 5·10 lakhs)	24·94	— The order was taken up at an uneconomic price, expecting more orders to flow and take care of the initial losses; but this did not happen. The Company did not take any firm committment from the Laboratory about placing of further orders.

On these 16 cases, with total contract value Rs. 589 lakhs, loss of Rs. 545 lakhs was incurred mainly due to initial under-estimation of costs, acceptance of uneconomic prices, time and cost over-runs, non-recovery of development costs from the customers, etc.

The Company stated (September, 1983) that due to critical and lean order book position many of the orders had to be accepted either at cost or sometimes below cost. It was further stated that a Business Development Group had been constituted in 1980-81 to plan, coordinate and monitor technical, financial and marketing activities and develop multiple M.I.S. to serve the requirement of various operations; and this group is constantly in touch with potential customers and also identifies new projects and schemes, etc.

Liquidated damages for delays in delivery

11.2.3 Due to slippages in deliveries, customers withheld amounts from the final bills towards liquidated damages. The amount so withheld and pending settlement in 82 cases to end of March, 1984 worked out to Rs. 145.21 lakhs. In addition Rs. 109.39 lakhs were withheld by customers for sundry reasons and Rs. 33.42 lakhs due to non-settlement of customer's "free issue material account".

The Company stated (July, 1983) that it had to accept liquidated damages clause in all contracts as it was the common practice and as the competing private sector firms also accept such a clause; wherever the delays were due to customers the matter had been taken up and where possible amounts were collected.

11.3 Credit control

11.3.1 The Company did not lay down any clear credit policy till 1973-74. The "price estimation manual" prepared in August, 1974 prescribed the terms of payment to be incorporated in the contracts. For the shop fabricated items these terms are as under :

	With Company's material	With Client's material
	(percentage of the total value of the order)	
Initial advance	20	20
On completion of 1/4 delivery . .	20	10
On completion of 1/2 delivery . .	20	10
On proof of despatch	35	55
On receipt of material at site . . .	5	5

11.3.2 The following table gives value of book debts at the end of the year and sales during the year, during the six years upto 1983-84 :

(Rupees in lakhs)

Year	Book debts at the end of the year	Sales during the year (excluding jobs done for internal use and excise duty)	Percentage of book debts to sales	Book debts in terms of months' sales
1978-79 .	437·33	1603·21	27·28	3·00
979-80 .	689·16	2744·65	25·11	3·01
1980-81 .	1080·23	2939·28	36·75	4·41
1981-82 .	1095·02	2731·68	40·09	4·81
1982-83 .	1322·23	3973·19	33·28	3·99
1983-84 .	1290·68	4476·48	28·83	3·46

The figures show a sharp jump in the ratio of debts to Sales in 1980-81, with a further increase in 1981-82. In 1982-83 and 1983-84, the jump in Sales has lowered the percentage.

11.3.3 The Audit Board asked about the system of continuous review and chasing of overdues and also about the system of providing for doubtful debts and writing-off irrecoverables. The Company's reply (September, 1983) was as under :

(i) A system of making provision for doubtful debts has been introduced from 1978-79 at 10% of all amounts withheld by the customers and outstanding for more than one year. Amounts withheld on account of liquidated damages by customers are provided for as follows :

Amounts withheld towards liquidated damages and outstanding for more than 3 years .	60%
Amounts withheld and outstanding for 2 to 3 years	50%
Amounts withheld and outstanding for 1 to 2 years	25%

(ii) The net provisions made during last 4 years and the actual amounts written off as unrecoverable are :

(Rupees in lakhs)

	Amount of net provision made	Amount written-off
1980-81	21·69	Nil
1981-82	38·73	0·32
1982-83	44·68	10·13
1983-84	40.58	Nil

11.3.4 The party-wise/age-wise break up of the debts outstanding for more than one year as on 31st March, 1984 is as follows :

(Rupees in lakhs)

	Public Sector Under-takings	Govern-ment depart-ments	Others	Total
Debts over one year but less than 2 years . . .	90·72	6·01	7·54	104·27
Over two years but less than 3 years . . .	50·42	3·64	11·95	66·01
Over three years . .	153·31	10·97	14·59	178·87
Total .	294·45	20·62	34·08	349·15

11.3.5 The outstanding debtors include Rs. 288.02 lakhs withheld by customers for the reasons stated below :

(Rupees in lakhs)

Reasons	Amount
Delayed deliveries	145·21
Customer's material not fully accounted for . .	33·42
Other reasons	109·39
Total .	288·02

In May, 1979 these outstandings were reviewed by the Ministry of Heavy Industry with particular reference to the amounts withheld as liquidated damages for delayed deliveries. While accepting that there was delay on the part of the Company in supplying equipment within the contractual dates it was mentioned that there were similar delays by other suppliers also to the Fertilizer Corporation of India and hence the delay in commencement of production by the F.C.I. Units could not be attributed exclusively to the Company.

In October, 1980 further discussions were held between the Ministries of Heavy Industry and Petroleum & Chemicals and BHPV. It was decided that amounts of Rs. 10,000 or so, on individual items, could be waived straight away and no deductions be made by the customers; and that in other cases it would be necessary to examine whether there had in fact been any consequential loss to the customer units which could be attributed wholly to the Company and in such a situation penalties commensurate with the defaults might be imposed.

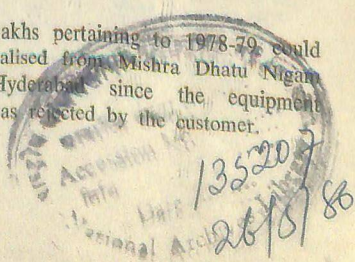
It was stated by the Company (March, 1982) that it had approached all customers for re-examination of the cases in the light of the guidelines issued in the discussions held in October, 1980 and that all the customers are favourably considering the pending claims.

11.3.6 A study of some outstandings revealed the following :

(i) Rs. 46.75 lakhs was withheld by Steel Authority of India Limited, Bokaro in 1980-81 as liquidated damages. The Company could not take up the issue with the customer since the rectification work on certain equipments has not been completed. Of this amount recovery of Rs. 28.05 lakhs was considered doubtful.

(ii) Rs. 16.26 lakhs was withheld by Fertilizer Corporation of India, Nangal in 1975-76 and 1976-77. (Rs. 14.31 lakhs as liquidated damages and Rs. 1.95 lakhs for Sundry reasons). The Company tried to get back these amounts but did not succeed.

(iii) Rs. 1.77 lakhs pertaining to 1978-79 could not be realised from Mishra Dhatu Nigam Limited, Hyderabad since the equipment supplied was rejected by the customer.



(iv) Out of Rs. 17.57 lakhs due from Fertilizer Corporation of India, Sindri the Company pursued claims amounting to Rs. 14.83 lakhs and got them settled for Rs. 8.98 lakhs. Claims for the balance amount of Rs. 2.74 lakhs could not be pursued with the customer for want of enough supporting information/ documentation.

(v) Meena Air Products withheld Rs. 3.93 lakhs as liquidated damages and Rs. 1.06 lakhs on account of equipment not giving the rated capacity. These amounts have not been collected so far.

(vi) Indian Drugs and Pharmaceuticals Limited, Rishikesh deducted Rs. 2.57 lakhs claimed as excise duty as the order did not enable excise duty to be added to the price. (The Finance Wing pointed out this omission at the time of accepting the order, but it was not got corrected).

12. MATERIAL MANAGEMENT AND INVENTORY CONTROL

12.1 Inventory

12.1.1 The following table gives the value of inventory at the end of each year from 1978-79 to 1983-84 under broad categories :

(Rupees in lakhs)

Year	Raw materials and components	Work-in-progress	Finished goods (including bought out items)	Stores, Spares Loose tools	Goods under inspection and in transit	Total
1	2	3	4	5	6	7
1978-79	736·34	387·12	801·21 (19·52)	297·05	226·37	2467·61
1979-80	1046·59	516·14	691·53 (87·50)	327·93	207·39	2877·08
1980-81	929·79	531·92	639·51 (22·19)	313·63	130·46	2567·50
1981-82	1035·83	856·27	676·80 (48·61)	343·33	164·53	3125·37
1982-83	1207·89	875·75	348·23 (103·87)	350·90	278·14	3164·78
1983-84	1384·57	1083·49	837·46 (85·40)	377·03	2376·66	6144·61

(Figures in brackets represent despatches with customers)

Out of finished goods valued at Rs. 837.46 lakhs in stock on 31-3-1984, goods valued at Rs. 14.21 lakhs had been lying in stock for more than one year, reportedly because Government customers had no money to pay and did not lift the stocks.

12.1.2 The Committee on Inventory Control (BPE), after a study (1974-75) of the inventory suggested (July 1976) the following norms for stocks :

		Number of months' consumption
Raw materials	Imported	12
	Indigenous	6
Bought out components	Imported	6
	Indigenous	3
Maintenance stores	..	4 to 6
Tools	..	3 to 4
Electrodes	Imported	6 to 9
	Indigenous	3 to 4

12.1.3 The following table gives details of inventory holdings under different categories at the end of March 1984 as compared to the norms suggested by the BPE :

Category of inventory	Inventory as on 31st March 1984	Average monthly consumption during 1983-84	Stock in terms of number of months' consumption	BPE norms in number of months' consumption	Inventory to be held as per BPE norms	Value of inventory in excess of norms
	(Rupees in lakhs)		(Number of months)			(Rupees in lakhs)
Raw materials						
Imported	559·20	42·98	13·01	12	515·76	43·44
Indigenous	230·36	13·06	17·64	6	78·36	152·00
Bought out component						
Imported	296·61	73·73	4·03	6	442·38	(—)145·77
Indigenous	355·78	41·80	8·52	3	125·40	230·38
Electrodes						
Imported	54·56	2·82	19·35	6 to 9	25·38	29·18
Indigenous	51·04	6·09	8·38	3 to 4	24·36	26·68
Maintenance stores	63·13	10·98	5·75	4 to 6	65·88	(—)2·75
Tools	35·84	3·09	11·60	3 to 4	12·36	23·48
Spares	133·83	4·36	30·70	9	39·24	94·59
Total	1780·35	198·91	8·95		1329·12	451·23

The figures show that though the inventory of imported bought out components and maintenance stores were less than the norms, the total value of inventory to end of March 1984 was in excess of the norms by Rs. 451.23 lakhs, mainly because of large excesses in indigenous raw materials and indigenous bought out components.

The Ministry stated (February 1984) "the closing stores inventory as on 31st March 1983 was Rs. 401.91 lakhs or 37% higher than the BPE norms. This excess inventory of 37% represents the surplus and non-moving stocks. Efforts are being made to dispose of surplus items and sizeable quantity of off-cuts. Due to the recession in the market for steel and for small oxygen plants, the marketing of small oxygen plants has been adversely affected, as a result Rs. 150 lakhs worth bought out components inventory is being held".

12.2 Surplus and non-moving stores

The value of surplus and non-moving stores to end of March 1984 was Rs. 340.30 lakhs (including surplus stores of Rs. 95.92 lakhs). An audit review of non-moving stores (each item worth Rs. 1 lakh and above) held in stock, showed that 38,623 Kg. of carbon steel plates (value : Rs. 5.25 lakhs) were imported against specific sale orders after completion of which the material has been in stock since March 1976. Similarly, 76 tonnes of stainless steel bends flanges, etc. (value : Rs. 8.75 lakhs) bought before August 1976 against specific requirements remained unutilised.

The Company stated (September 1983) that bought-out components and spares do not have general use and efforts are being made to identify suitable equipments in which these could be used when new orders are received; for raw materials, efforts are also being made to identify the items which have alternative uses.

12.3 Off-cuts

The off-cuts arise when regular plates are cut. Some of these off-cuts form part of non-moving stock. A study of the arising of off-cuts and their utilisation in manufacture during the four years upto 1983-84 disclosed the following :

(In tonnes)

Year	Opening balance	Off-cuts arising during the year	Total	Off-cuts utilised during the year	Closing balance
1980-81 . . .	727·48	204·06	931·54	270·40	661·14
1981-82 . . .	661·14	452·17	1113·31	351·36	761·95
1982-83 . . .	761·95	210·99	972·94	117·44	855·50
1983-84 . . .	855·50	1599·38	2454·88	1022·30	1432·58

The Off-cuts are being valued at rates applicable to regular plates for purposes of arriving at the value of inventories. The Company proposes to use the off-cuts for fabrication of vessels in future.

12. MATERIAL MANAGEMENT AND INVENTORY CONTROL

12.1 Inventory

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(Rupees in lakhs)

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Out of finished goods valued at Rs. 837.46 lakhs in stock on 31-3-1984, goods valued at Rs. 14.21 lakhs had been lying in stock for more than one year, reportedly because Government customers had no money to pay and did not lift the stocks.

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Electrodes	Imported	6 to 9
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Category of inventory	Inventory as on 31st March 1984	Average monthly consumption during 1983-84	Stock in terms of number of months' consumption	BPE norms in number of months' consumption	Inventory to be held as per BPE norms	Value of inventory in excess of norms
	(Rupees in lakhs)		(Number of months)			(Rupees in lakhs)
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Indigenous	230·36	13·06	17·64	6	78·36	152·00
Bought out component						
Imported	296·61	73·73	4·03	6	442·38	(—)145·77
Indigenous	355·78	41·80	8·52	3	125·40	230·38
Electrodes						
Imported	54·56	2·82	19·35	6 to 9	25·38	29·18
Indigenous	51·04	6·09	8·38	3 to 4	24·36	26·68
Maintenance stores	63·13	10·98	5·75	4 to 6	65·88	(—)2·75
Tools	35·84	3·09	11·60	3 to 4	12·36	23·48
Spares	133·83	4·36	30·70	9	39·24	94·59
Total	1780·35	198·91	8·95		1329·12	451·23

The figures show that though the inventory of imported bought out components and maintenance stores were less than the norms, the total value of inventory to end of March 1984 was in excess of the norms by Rs. 451.23 lakhs, mainly because of large excesses in indigenous raw materials and indigenous bought out components.

The Ministry stated (February 1984) "the closing stores inventory as on 31st March 1983 was Rs. 401.91 lakhs or 37% higher than the BPE norms. This excess inventory of 37% represents the surplus and non-moving stocks. Efforts are being made to dispose of surplus items and sizeable quantity of off-cuts. Due to the recession in the market for steel and for small oxygen plants, the marketing of small oxygen plants has been adversely affected, as a result Rs. 150 lakhs worth bought out components inventory is being held".

12.2 Surplus and non-moving stores

The value of surplus and non-moving stores to end of March 1984 was Rs. 340.30 lakhs (including surplus stores of Rs. 95.92 lakhs). An audit review of non-moving stores (each item worth Rs. 1 lakh and above) held in stock, showed that 38,623 Kg. of carbon steel plates (value : Rs. 5.25 lakhs) were imported against specific sale orders after completion of which the material has been in stock since March 1976. Similarly, 76 tonnes of stainless steel bends flanges, etc. (value : Rs. 8.75 lakhs) bought before August 1976 against specific requirements remained unutilised.

The Company stated (September 1983) that bought-out components and spares do not have general use and efforts are being made to identify suitable equipments in which these could be used when new orders are received; for raw materials, efforts are also being made to identify the items which have alternative uses.

12.3 Off-cuts

The off-cuts arise when regular plates are cut. Some of these off-cuts form part of non-moving stock. A study of the arising of off-cuts and their utilisation in manufacture during the four years upto 1983-84 disclosed the following :

(In tonnes)

Year	Opening balance	Off-cuts arising during the year	Total	Off-cuts utilised during the year	Closing balance
1980-81 . . .	727·48	204·06	931·54	270·40	661·14
1981-82 . . .	661·14	452·17	1113·31	351·36	761·95
1982-83 . . .	761·95	210·99	972·94	117·44	855·50
1983-84 . . .	855·50	1599·38	2454·88	1022·30	1432·58

The Off-cuts are being valued at rates applicable to regular plates for purposes of arriving at the value of inventories. The Company proposes to use the off-cuts for fabrication of vessels in future.

13. COSTING SYSTEM

13.1 As the Company produces equipment to suit the requirements of individual customers, it follows the system of job costing and costs are ascertained on historical basis. The costing system followed by the Company has the following broad features :

— The cost of materials is collected on the basis of material requisitions and the issue price is worked out on weighted average method.

— The average hourly rate for direct labour in respect of each work centre is determined and the direct labour cost for each job is worked out by applying these hourly rates to the number of hours booked on each job.

— The total overheads (including administration, selling and distribution) are expressed as percentage of direct labour cost and are applied at that percentage rate to different jobs. The under or over absorbed overhead expenses are adjusted on the basis of actuals at the end of the year.

13.1.1 As orders are executed to suit individual requirements of customers, the Company feels that it would be difficult to lay down standards for material consumption and fabrication charges. According to the Company, the costing system followed enables them to compile cost centre-wise utilisation of the capacity, analyse the estimated as well as actual direct labour hours utilised for each part operation and assess the cost of re-work/rejection. However, as costs are being ascertained only on historical basis, the Company is not able to review the cost trends periodically so as to take remedial steps to avoid cost over runs.

13.1.2 The Company followed the method of apportionment of overheads on the basis of direct labour hours utilised till the year 1981-82. Effective from the year 1982-83, the Company introduced the system of allocating overheads on the basis of machine hours; it is proposed to streamline the system of costing with a view to ascertaining the costs, cost centre-wise and machine centre-wise.

13.2 The Company commenced comparison of actual costs incurred in executing the jobs with the estimates from April, 1972. A comparison of actual costs (material cost and fabrication cost) with the cost estimates in respect of jobs completed during the seven years from 1977-78 to 1983-84 is given below :

(Rupees in lakhs)

Year	Estimates			Actuals			Variance { Saving + / Excess —		
	Material	Fabrication, etc.	Total	Material	Fabrication, etc.	Total	Material	Fabrication etc.	Total (nett)
1977-78	542·89	671·42	1214·31	441·62	1068·28	1509·90	(+) 101·27	(—) 396·86	(—) 295·59
1978-79	412·10	535·19	947·29	366·37	968·84	1335·21	(+) 45.73	(—) 433·65	(—) 387·92
1979-80	349·14	513·23	862·37	361·28	1028·31	1389·59	(—) 12·14	(—) 515·08	(—) 527·22
1980-81	847·11	947·70	1794·81	752·43	1016·14	1768·57	(+) 94·68	(—) 68·44	(+) 26·24
1981-82	998·86	877·70	1876·56	791·16	1017·52	1808·68	(+) 207·70	(—) 139·82	(+) 67·88
1982-83	829·50	985·42	1814·92	596·63	658·98	1255·61	(+) 232.87	(+) 326.44	(+) 559·31
1983-84	1601·02	1461·49	3062·51	1097·59	1391·40	2488·99	(+) 503·43	(+) 70·09	(+) 573·52

While material costs have generally been much lower than estimated, fabrication costs in most years have been enormously higher than the estimates (by over 80% in 1978-79 and over 100% in 1979-80).

13.2.1 Analysis of material cost variances is not being done by the Company for all the completed orders. For e.g. out of 79 sale orders completed during 1980-81, analysis of material cost variance has been done only in respect of 3 sale orders. The reasons for variance in these cases were found to be due to :

— Under estimation of requirements.

— Under estimation of costs.

— Non-inclusion of certain items actually required.

It was stated by the Ministry (February, 1984) that the Company has since been following sale order

budgeting system and the control against each sale order has now become possible, resulting in better financial control.

13.2.2 Since the inception of the Company, actual costs have been grossly in excess of estimates each year. In computing the actual costs of fabrication, the Company has been following the system of absorbing overheads at a common rate for all expenses including works, administration, selling and distribution. The Company stated (July, 1983) that it "has adopted since beginning full absorption costing system for the purpose of determining total costs. Under this system all the costs incurred during a period should be absorbed by all the products manufactured. The main reason for adverse variances is under-utilisation of capacity although full capacity costs are incurred."

13.3 Deficiencies in costing system

The following deficiencies are found in the system of costing followed in the Company :

(i) The total hours purchased are not being reconciled with total hours booked to various job orders.

(ii) A common percentage rate for overhead absorption for all expenses including works, administration, selling and distribution is adopted with consequential repercussion in valuation of work-in-progress/finished stock.

13.4 Regarding the cost control and cost reduction measures taken by the Company, the Ministry/ Company representatives informed the Audit Board (February 1984) as under :

(i) The Company has started value management of SQC techniques to bring in the awareness among the staff.

(ii) It is proposed to strengthen the design organisation, introduce better material selection/ production methods, reduce rate of rejections and commission R & D studies to achieve cost reduction.

(iii) The purchase of a computer controlled flame cutting machine is under consideration to bring down the percentage of off-cuts.

(iv) The system of monitoring of costs during the actual period of execution of works is being introduced for more effective cost control.

(v) A number of groups have been formed and have started functioning to achieve economy in usage of materials, reducing power consumption, utilisation of off-cuts, standardisation of materials, etc.

(vi) The group appointed to examine the usage of materials for Horten spheres has suggested various measures by which it would be possible to reduce material consumption to the extent of 15 tonnes in the manufacture of equipment.

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(vi) The group appointed to examine the usage of materials for Horten spheres has suggested various measures by which it would be possible to reduce material consumption to the extent of 15 tonnes in the manufacture of equipment.

14. FINANCIAL POSITION AND WORKING RESULTS

14.1 Financial position

The following table gives the details of the financial position of the Company, under broad headings for the six financial years 1978-84 :

(Rupees in lakhs)

	1978-79	1979-80	1980-81	1981-82	1982-83	1983-84
Liabilities						
(a) Paid-up capital (including advance for shares)	1069·70	1403·64	1461·43	1563·28	1622·28	1731·28
(b) Reserves and surplus	2·01	2·01	2·01	2·01	2·01	2·01
(c) Borrowings from :						
Government	2110·54	1941·72	2102·72	2293·87	1748·84	1418·84
Cash credit	795·41	822·41	442·94	..	..	..
(d) Trade dues and other liabilities (including provisions and interest accrued and due)	2382·43	3051·21	3115·23	4165·07	5970·99	9135·30
Total	6360·09	7220·99	7124·33	8024·23	9344·12	12287·43
Assets						
(e) Gross block	2136·76	2229·92	2432·34	2524·40	2777·14	3047·96
(f) Less : Depreciation	756·50	865·16	978·76	1098·31	1238·89	1410·36
(g) Net fixed assets	1380·26	1364·76	1453·58	1426·09	1538·25	1637·60
(h) Capital work-in-progress (including plant and machinery under erection and unallocated capital expenditure)	39·86	58·02	24·20	158·62	37·89	13·30
(i) Investments	1·28	1·28	1·28	1·28	1·28	1·28
(j) Current assets, loans and advances	3570·59	4443·37	4314·21	5156·61	6561·83	9903·84
(k) Miscellaneous expenditure, etc :						
Deferred revenue expenditure	65·32	83·87	109·58	120·34	150·89	122·08
Cumulative loss	1302·78	1269·69	1221·48	1161·29	1053·98	609·33
Total	6360·09	7220·99	7124·33	8024·23	9344·12	12287·43
Capital employed	2568·42	2756·92	2652·56	2417·63	2129·09	2469·14
Net Worth	(—)296·39	52·09	132·38	283·66	419·42	1001·88

Note : 1. Capital employed represents net fixed assets *plus* working capital

2. Net worth represents paid-up capital *plus* reserves *less* intangible assets.

14.2 Working results

14.2.1 The working results of the Company for six years upto 1983-84 are as follows :

(Rupees in lakhs)

1	2	1978-79 3	1979-80 4	1980-81 5	1981-82 6	1982-83 7	1983-84 8
(i)	Sales including jobs done for internal use and equipment awaiting despatch (excluding excise duty)	1631·91	2769·60	2954·81	2777·50	3992·84	4509·79
(ii)	Accretion (+)/Decretion (—) in finished goods and work-in-progress.	(+)412·96	(+)19·33	(—)36·24	(+)361·65	(—)309·09	(+)696·96
(iii)	Sale value of production (i + ii)	2044·87	2788·93	2918·57	3139·15	3683·75	5206·75
	Less : Consumption of raw materials	1060·36	1399·36	1391·94	1402·90	1601·68	2125·67
(iv)	Contributed value (value added)	984·51	1389·57	1526·63	1736·25	2082·07	3081·08
(v)	Conversion cost as detailed below :						
	Salaries and other benefits to employees	434·37	479·09	517·44	598·27	705·57	926·11
	Site erection and fabrication expenses	128·58	165·09	141·49	144·56	195·82	334·43
	Interest on Government loans and cash credit	307·79	311·68	360·72	331·65	290·68	207·27
	Depreciation	103·71	104·52	110·25	121·16	138·32	169·04

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Table—*Contd.*

(Rs. in lakhs)

1	2	1978-79 3	1979-80 4	1980-81 5	1981-82 6	1982-83 7	1983-84 8
	Other expenditure including prior period adjustments and provisions	615·10	379·87	438·19	574.92	762·64	1212·08
	Total . .	1589·55	1440·25	1568·09	1770·56	2093·03	2848·93
	Less : Miscellaneous Income and provisions written back .	67·35	83·77	89·66	94·50	118·27	212·51
(vi)	Net conversion cost . . .	1522·20	1356·48	1478·43	1676·06	1974·76	2636·42
(vii)	Net loss (—)/profit (+) (including prior period adjustments) (iv—vi) .	(—)537·69	(+)33·09	(+)48·20	(+)60·19	(+)107·31	(+)444·66
(viii)	Percentage of contributed value to :						
	Value of production . . .	48·15	49·82	52·31	55·31	56·52	59·17
	Total conversion cost (v) . .	61·94	96·48	97·36	98·06	99·48	108·15

14.2.2 The Company incurred losses since inception and the accumulated loss upto 31st March 1979 worked out Rs. 1302.78 lakhs. From 1979-80 the Company earned profits and the accumulated loss to end of 1983-84 came down to Rs. 609.33 lakhs as against the paid up capital of Rs. 1731.28 lakhs as on that date. The cumulative loss of Rs. 609.33 lakhs would go up further, if penal interest amounting to Rs. 537.56 lakhs payable to the Government for belated repayment of loan instalments, not provided for in the accounts, is also taken into account.

14.2.3 The huge losses incurred upto 1978-79 and low profits in later years were mainly attributed by the Company to :

- Low order book position and non-materialisation of orders as expected.
- Low level of production which could not absorb fully the fixed expenses like interest charges and depreciation.
- Increase in electricity tariff and power cuts imposed by the Andhra Pradesh State Electricity Board.
- Non-availability of raw materials to the full extent and non-availability of materials to be supplied free by customers in time.
- Rise in prices of fuels and consumables.
- Rise in rates of interest on Government loans and bank borrowings.
- Absence of escalation clause in the sale orders executed due to which the increase in prices of materials and labour could not be passed on to the customers.

14.2.4 The Ministry said (February 1984) that the following steps have been/are being taken to improve the working results of the Company :

- Taking up of many diversification schemes.
- Action taken towards improving productivity.
- Action taken to reduce the procurement lead time as well as production cycle time to meet the customers' project requirements.

14.3 Profitability : Projections and Actuals

14.3.1 According to the feasibility report given by the Collaborators (July, 1965), the Company was expected to break-even in the third year of commencement of production or in the fifth year of commencement of construction i.e., by 1971-72. The profitability study subsequently made by the Company in August 1969 and February 1971, at the time of revision of project estimates, envisaged that it would break-even in 1973-74 at 75% level of production and achieve 100% level of production in 1974-75. But even in 1974-75, the level of production achieved was only 35% and as against the estimated profit of Rs. 107 lakhs in that year the Company incurred a loss of Rs. 104 lakhs.

14.3.2 The Company revised the project cost again in June 1976 which was approved by the Government in May 1978. The projection of profit/loss in the revised estimates for the period of 1976-77 to 1980-81 and the profit/loss made during this period are as follows :

(Rupees in lakhs)

Year	Estimated value of production	Actual value of production	Estimated value of production at cost*	Actual value of production at cost*	Estimated profit (+)/loss (—)	Actual profit (+)/loss (—)
1976-77	2600	2445	2595	2510	(+)5	(—)65
1977-78	2800	2115	2760	2175	(+)40	(—)60
1978-79	3500	2045	3350	2583	(+)150	(—)538
1979-80	4000	2789	3810	2756	(+)190	(+)33
1980-81	4500	2919	4275	2871	(+)225	(+)48
					(+)610	(—)582

*Excluding value of materials supplied by customers.

It will be seen that the Company incurred losses till 1978-79 though profits were to be earned from 1976-77 onwards. The profits earned in 1979-80 and 1980-81 were mainly due to interest subsidy sanctioned by the Government for those years (Rs. 77.51 lakhs in 1979-80 and Rs 43.67 lakhs in 1980-81).

14.4 Cash management

14.4.1 The following points of interest were noticed in management of cash resources by the Company during 1982-83 :

(a) The Company has cash credit arrangements with State Bank of India upto a limit of Rs. 1150 lakhs from 1978-79. During 1982-83, except in the months of June to August 1982, the Company had favourable balances in cash credit account. The Company received an advance of Rs. 1418.56 lakhs against an order from Visakhapatnam Steel Project for which shipments are expected at the end of 1983-84 or at the beginning of 1984-85.

(b) The following table indicates the position of funds available, investments made, interest earned etc. in each of the months from October 1982 to March 1983 :

Month	Balance at beginning of the month (Rupees)	Deposits made during the month (Rupees)	Duration of deposits (Days)	Rate of interest	Interest earned (Rupees)
October 1982	28,39,199	..	..	..	..
November 1982	14,10,43,270	14,20,00,000	46	4%	7,15,835
December 1982	29,52,905	*7,30,00,000	91	5%	9,10,000
		*7,00,00,000	46	4%	3,52,877
January 1983	9,93,605	..	..	..	..
February 1983	27,97,053	*3,00,00,000	46	4%	1,51,233
		*8,00,00,000	15	3%	98,630
		30,00,000	91	5%	37,396
March 1983	14,96,439	*7,30,00,000	46	4%	43,078
As on 31st March 1983	1,39,94,858	7,30,00,000	(upto 31st March 1983)		

*Deposits were made either by encashing the existing deposits on maturity or when further funds were received.

It may thus be seen that the Company invested the surplus funds from November 1982 onwards, which arose mostly due to the advance received from Visakhapatnam Steel Project, in short term deposits. The Company has taken loan from Government at interest rates ranging from 7.5% to 15%. The Company paid the loan instalments of Rs. 604.02 lakhs due for 1982-83 (including Rs. 136.33 lakhs representing pre-mature repayment of a loan carrying higher rate of interest in preference to repayments due on loans carrying lower rates of interest) along with interest of Rs. 288.75 lakhs on 24th March 1983. As soon as the Company received the advance of about Rs. 1418 lakhs on 30th October 1982 from Visakhapatnam Steel Project (for which shipments are expected only after more than a year) it could have immediately repaid the loan instalments of Rs. 604.02 lakhs due to the Government in 1982-83 prematurely and avoided payment of interest at rates higher than the rates earned from short term deposits. Even after allowing a reasonable time of 3 weeks for a decision had the Company repaid the loan instalments of Rs. 604.02 lakhs in the third week of November 1982 itself, it would have saved Rs. 28.88 lakhs in interest charges. Deducting interest charges earned (Rs. 10.07 lakhs) at 5% on Rs. 604.02 lakhs for 4 months, the net saving would have been Rs. 18.81 lakhs.

Similarly, if the loan instalments of Rs. 534.08 lakhs due in 1983-84 had been repaid prematurely in April 1983 itself, when the Company had more than Rs. 1000 lakhs in deposits earning interest at 6%, there would have been a saving by way of differential interest amounting to Rs. 48.07 lakhs.

(c) The following favourable balances were available in the cash credit account on various dates during March 1983:

As on 1st March 1983	Rs. 14·96 lakhs
As on 3rd March 1983	Rs. 116·90 lakhs
As on 10th March 1983	Rs. 92·57 lakhs
As on 15th March 1983	Rs. 109·73 lakhs
As on 20th March 1983	Rs. 190·44 lakhs
As on 25th March 1983	Rs. 432·59 lakhs
As on 31st March 1983	Rs. 139·95 lakhs

It may be seen that a minimum of about Rs. 90 lakhs was allowed to remain in the cash credit account for more than 20 days which did not yield any interest and the funds have not been invested fruitfully.

The Company stated (September 1983) that the surplus funds was a temporary feature and hence could not be used either for long term investments or for repayment of loans and that the Board of Directors were aware of that position.

14.4.2 When the Audit Board brought this case of defective cash management to the notice of the Ministry, the Ministry officials while agreeing that it was a valid point stated (February 1984) that the Company was keeping the working capital position in view and could not plan for long term investments. It may, however, be mentioned that no decision was taken by the Company during the above period regarding the utilisation of existing cash resources in the best possible manner.

15. INTERNAL AUDIT

15.1 The Internal audit department of the company is headed by an Officer of the rank of Joint Financial Adviser who works under the Financial Adviser and Chief Accounts Officer.

An Internal Audit Manual was prepared during 1969-70 setting forth the functions of Internal Audit department. Internal Audit is conducted on the basis of an annual audit programme drawn well in advance of the year and duly approved by the Chairman and Managing Director. But the annual programme does not cover important areas like purchases, sales, etc. and also the review of systems and procedures. The areas covered by the Internal Audit at present are vouching of cash book, scrutiny of gate passes, log books, guest house records, scrap disposal transactions, besides verification of stores records, stock, fixed assets, etc., and transactions at some of the site offices. The internal audit reports are not put up to the Board of Directors.

15.2 The Statutory Auditors of the Company observed that there was need to strengthen the Internal Audit department with more personnel to be more effective as the Internal Audit work carried out by a single officer was not comprehensive enough. They also observed that the Internal Audit department is not independent of the accounts organisation as both Internal Audit and Accounts departments are under the control of the Financial Adviser and Chief Accounts Officer.

The Company stated (July 1983) that "steps are being taken to strengthen the internal audit by posting additional hands".

(K. N. ROW)
Chairman, Audit Board and Ex-officio Additional Deputy Comptroller & Auditor General (Comml.)

New Delhi.
The 12th September, 1985.

Countersigned

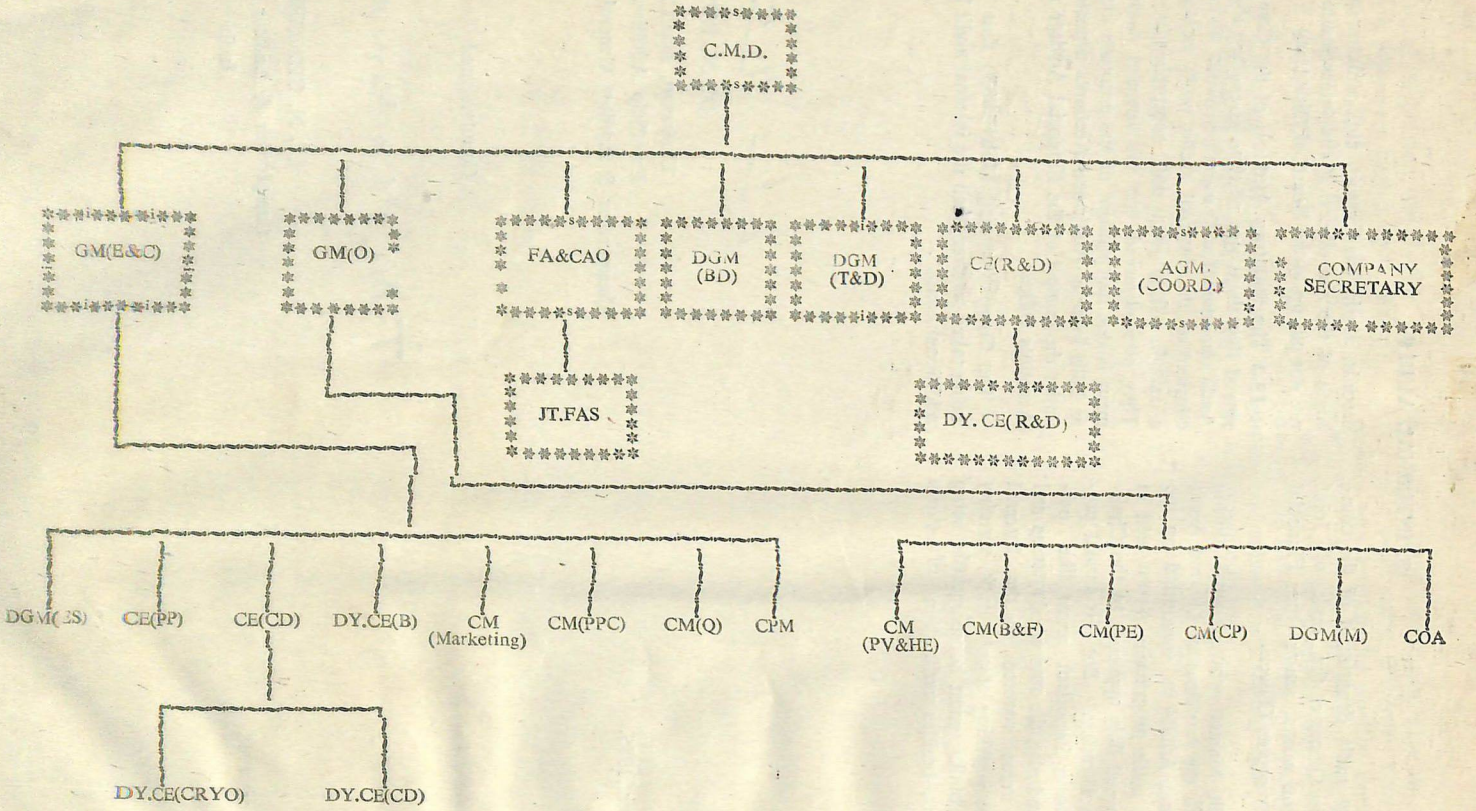
(T. N. CHATURVEDI)
Comptroller & Auditor General of India

New Delhi
The 12th September, 1985.

ANNEXURE I

(Referred to in para 3)

Organisational chart as existing in October, 1983



ERRATA

Page No.	Col. No.	Para No.	Line no. of para	*For*	*Read*
(i)	..	..	Serial No. 12	31-3	31-32
1	2nd	Table under 1.2.5	3rd of Column 5	442·3	442·36
3	1st	1.5.8	1st	10.90	10.96
3	2nd	1.6.1	3rd	BHVP	BHPV
12	2nd	7.3.6	1st	Czesh	Czech
13	1st	7.4.2	19th	this factor	thus factor
16	Table	8.2.2	1st line under "Idle hours" in 1983-84	..	1.56
16	Table	8.2.2	2nd line under "Idle hours" in 1983-84	0.	0.31
21	1st	9.1	8th line	1881.83	1881.33
22	Table	9.4	1st line under 'year'	1278.79	1978-79
27	Table	11.2.2	15th line under Col. 4 of the table	Value	Valued
27	Table	11.2.2	S. No. 11 of table	Corporatio	Corporation
28	2nd	table under 11.3.2	1st line in table against 1978-79	3.00	3.27
28	2nd	table under 11.3.2	2nd line of table	979.80	1979-80
33	1st	13.2.1	3rd	for e.g.	for example

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