

Table 8.1.8 第1 Step 減価償却資産の原価部門別配賦額

(Unit : Rs. in Lakhs)

原 価 部 門	固 定 資 産 取 得 額				
	建 物	機 械 装 置	車 輛	繰 延 資 産	合 計
原 料 ヤ ー ド	981	5,184	29	396	6,590
焼 結	1,890	7,747	14	596	10,247
コ ー ク ス	47	1,505	0	75	1,627
高 炉	857	20,629	23	1,147	22,656
生 石 灰	137	2,000	0	114	2,251
転 炉	2,026	11,272	237	847	14,382
造 塊	299	1,076	174	74	1,623
ブ ル ー ム C C	471	2,698	0	180	3,349
第 1 ビ レ ッ ト C C	471	2,644	0	178	3,293
第 1 新 棒 鋼 ミ ル	814	14,618	0	874	16,306
ブ ル ー ム ミ ル	26	4,672	0	231	4,929
ヘビー・ストラクチャーミル	26	1,289	0	64	1,379
ビ レ ッ ト ミ ル	31	545	0	28	604
マ ー チ ャ ン ト ミ ル	46	1,045	0	54	1,145
シ ー ト ミ ル	0	452	0	22	474
受 配 電	41	1,556	0	77	1,674
発 電 所	99	7,326	0	358	7,783
酸 素	133	6,195	0	300	6,628
高 炉 送 風 機	105	3,425	0	169	3,699
水 処 理	33	659	0	33	725
ガ ス	54	3,717	0	182	3,953
管 理 (overhead)	296	0	0	4,524	4,820
輸 送	183	0	0	9	192
合 計	9,066	100,254	477	10,532	120,329

Tabl 8・1・9 第2 Step (合計) 減価償却資産の部門別配賦額

(Unit : Rs. in Lakhs)

原 価 部 門	固 定 資 産 取 得 額				
	建 物	機 械 装 置	車 輜	繰 延 資 産	合 計
原 料 ヤ ー ド	1,168	5,749	29	435	7,381
焼 結	3,584	15,259	14	1,082	19,939
コ ー ク ス	1,162	25,941	278	1,326	28,707
高 炉	1,543	40,253	36	2,249	44,081
生 石 灰	152	3,001	0	166	3,319
転 炉	2,422	15,214	347	1,071	19,054
造 塊	299	1,076	174	74	1,623
ブ ル ー ム C C	471	2,698	0	181	3,350
第 1 ビ レ ッ ト C C	471	2,644	0	179	3,294
第 2 & 3 ビ レ ッ ト C C	818	4,536	72	262	5,688
第 1 新 棒 鋼 ミ ル	814	14,618	0	880	16,312
第 2 " "	895	17,512	0	909	19,316
ブ ル ー ム ミ ル	26	4,672	0	232	4,930
ヘ ビ ー ・ ス ト ラ ク チ ャ ー ミ ル	26	1,289	0	65	1,380
ビ レ ッ ト ミ ル	31	545	0	28	604
マ ー チ ャ ン ト ミ ル	46	1,045	0	54	1,145
( シ ー ト ミ ル )	( 0 )	( 452 )	( 0 )	( 22 )	( 474 )
受 配 電	41	2,044	0	101	2,186
発 電 所	142	14,510	0	712	15,364
酸 素	216	9,277	0	454	9,947
高 炉 送 風 機	158	5,142	0	255	5,555
水 処 理	33	659	0	33	725
ガ ス	54	3,900	0	192	4,146
整 備	276	925	0	66	1,267
管 理 (Overhead)	296	0	0	8,428	8,724
輸 送	183	0	4,937	255	5,375
合 計	15,327	( 452 ) 19,2509	5,887	( 22 ) 19,689	( 474 ) 23,3412

#### 8-1-4 既存設備の帳簿価格

BURNPUR 製鉄所の既存設備の帳簿価格(Book Value)は次のとおりである。

(Unit : Rs. in Lakhs)

種 類	1986年3月末	追 加 投 資	1993年3月末
土 地	38	—	38
建 物	2,215	—	1,812
機械および装置	5,421	9,205	6,003
車 輜	1,246	—	735
合 計	8,920	9,205	8,588

備考：① 追加投資には、№8 コークス炉（1987年稼働予定）と  
 №9 コークス炉（1991年稼働予定）を見込んだ。金額は  
 IISCOの予算額による。

② 1993年3月末の帳簿価格は、1986年4月以降の減価償  
 却費を控除した後の推定残存価額である。

既存設備の帳簿価格を認識する目的は8-3において説明する。

なお8-2の製造原価計算には、上記帳簿価格に関係する減価償却費を取り込んで  
 いる。

#### 8-1-5 GUA 鉱山粉鉱石水洗設備投資額

本スタディの対象外であるが、参考としてその投資見積り額をTable 8-1-9に  
 掲げる。

Table 8-1-9 粉鉱石水洗設備投資額

(Unit : Rs. in Lakhs)

費 目	金 額
土木および建築	760
機 機 および 装 置	1,647
据 付	138
車 輜	103
予 備 品	11
コンテインジェンシー	118
合 計	2,777

国内調達率 100%

## 8-2 製造原価の見積り

### 8-2-1 原価計算の基本的前提と方法

#### (1) 基本的前提

##### 1) 操業度は正常操業状態とする。

第1 Step (1993年)は粗鋼100万 T/Y ベース

第2 Step (1994年以降)は粗鋼215万 T/Y ベース

なお高炉改修時における変動原価の水準ならびに固定費の水準は第2 Step 正常操業時と変わらないものとみなした。

##### 2) 要素価格の基準時：1986年7月

##### 3) 計算単位：メートル法

##### 4) 物価変動の影響：一切織り込まれていない

#### (2) 原価計算の方法

##### 1) 工程別総合原価計算

但し工程は原則的には工場単位を意味し、それ以下の細分工程は設定しなかった。

##### 2) 補助部門間の配賦方法

ユーティリティ相互間の配賦は相互配賦法に依った。但しその他の補助部門間は、相互配賦法は採用していない。

##### 3) 製造原価の種類

「変動原価」と「全部原価」の2種類の原価計算を行なった。

##### 4) 変動費、固定費の区分

労務費、耐火材を除く修繕費、減価償却費、長期借入金金利、高炉修繕引当金繰入額、工場管理部門費および輸送部門費はすべて固定費と考えた。

歩留、原単位によって把握可能なものはすべて変動費と考えた。但し原単位で表現しがたい一部の消耗品についても変動費として把握したものがある。

##### 5) 化成品工場の扱い方

本スタディでは、影響度の程度に鑑みて、化成品工場は原価計算の対象外とした。

従ってコークス工場において、化成品向けの副産物を計上する段階までを対

象とした。

#### 6) 長期借入金金利の扱い方

「全部原価」には長期借入金金利を織り込んだ。当然のことながら、長期借入金金利支払額は操業の初期の段階においてもっとも大きく、年次の経過とともに小さくなって行く。従って平均化するために資本回収係数 (Capital recovery factor) を用い、年金額 (Annuity) から減価償却費を控除した後の残額を平均金利額とした。

なお残存率 (5%) のある場合は、そのことを資本回収係数の中で考慮した。

#### 8-2-2 原価要素の価格

原価要素の価格については、原則として IISCO の 1986 年度予算に依拠した。

但し一部について日本の価格レベルから推定したものがある。

次に主要原材料および副産物単価表 (Table 8-2-1) と労務費単価表 (Table 8-2-2) を掲げる。

Table 8.2.1 主要原材料および副産物単価表

(Unit : Rupee)

品名	単位	使用単価	備考
鉄 鈹 石 粉 (焼結用)	T	112	
鉄マンガン鈹石粉 ( " )	"	183	塊の85%評価とした。
鉄 鈹 石 High grade (高炉用)	"	142	Manoharpur およびMMTC
" Low grade ( " )	"	135	Gua および Manoharpur
" (転 炉 用)	"	145	MMTC (Banspani)
石 灰 石 (焼 結 用)	"	190	Bistra
" (高 炉 用)	"	190	"
" (転 炉 用)	"	250	Rama
ド ロ マ イ ト (焼 結 用)	"	195	Bistra
" (転 炉 用)	"	200	"、 (SMS grade)
珪 石	"	155	
ホ タ ル 石	"	4,007	
フェロマンガ	"	7,800	
フェロシリコン	"	13,800	
アルミニウム	"	23,300	
石 炭 (強 粘 結 炭)	"	675	Pathardih 30% Chasnalla 70%
" (準強粘結炭)	"	613	Kargali 67% Victoria W.33%
" (弱粘結炭)	"	473	Barmondia 50% Sripur 50%
" (オーストラリア炭)	"	1,020	FOB 4925US\$
" (ボイラー用)	"	356	
購 入 電 力	kWh	0.577	
購入スクラップ (転 炉 用)	T	2,030	リターン屑に同じ
耐 火 材 (転 炉 用 Main )	"	4,000	
" ( " Furnace )	"	7,450	
" ( " Ladle )	"	1,200	
" (造塊およびCC用Ladle)	"	2,077	
" Sliding nozzle (造 塊 CC用)	"	59,200	
" Castable (C C 用)	"	3,800	Hi-Al
" Nozzle ( " )	"	61,500	Zircon
鑄 型 (造 塊 用)	"	6,206	

品名	単位	使用単価	備考
定盤(造塊用)	T	6,408	
圧延ロール	#	20,000 ~28,000	
<副産物>			
スクラップ (Steel)	T	2,030	
# (Iron)	#	1,830	
# (Skull)	#	1,220	
# (Scale)	#	30	
ガス	10 <sup>6</sup> kg	113	BFG、COG、LDGとも
コークス粉	T	422	Pearl, Breeze の平均
高炉滓(Granulated)	#	237	After tax
高炉ダスト	#	67	

Table 8.2.2. 労務費単価表

(Unit : Rupee / 人・年)

区 分	単 価	備 考
< Executive >		
所 長	78,000	E-9
副 所 長	76,200	E-8
部 長	72,800	E-7
次 長	70,400	E-6-B
課 長	69,300	E-6-A
係 長	59,200	E-4
< Non-Executive >		
一 般 技 術	30,700	Second staff 単価を適用
一 般 事 務	30,700	" "
作 業 長	30,700	" "
工 長	27,500	推 定
マスターロール	22,400	( Muster Roll )



### 8-2-3 減価償却費

償却方法はすべて定額法による。

以下に、固定資産及び繰延資産の種類別減価償却費を示す。

Table 8.2.3 第1 Step 減価償却費

(Unit : Rs. in Lakhs)

種 類	取 得 額	耐 用 年 数	年 間 償 却 費	残 存 率
建 物	2,066	30年	287	5%
機 械 お よ び 装 置	100,254	13	7,326	5
車 輜	477	20	23	5
有 形 固 定 資 産 計	102,797		7,636	
エ ン ジ ン ア リ ン グ ・ フ ィ ー	3,846	10	385	0
教 育 訓 練 、 操 業 指 導	645	10	65	0
開 業 費	192	10	19	0
建 中 金 利	5,849	10	585	0
繰 延 資 産 計	10,532		1,054	
合 計	120,329		8,690	

Table 8.2.4 第2 Step (合計) 減価償却費

種 類	取 得 額	年 間 償 却 費
建 物	15,327	485
機 械 お よ び 装 置	192,961	14,101
車 輜	5,887	280
有 形 固 定 資 産 計	214,175	14,866
エ ン ジ ン ア リ ン グ ・ フ ィ ー	7,396	740
教 育 訓 練 、 操 業 指 導	771	77
開 業 費	370	37
建 中 金 利	11,174	1,117
繰 延 資 産 計	19,711	1,971
合 計	233,886	16,837

#### 8-2-4 高炉の特別修繕引当金

原価の平準化のために、高炉の特別修繕費については年々、引当金を計上する方式を採用した。

1) 修繕周期は8年、高炉1基当りの特別修繕費の見積り額は、1,624 Rs. in Lakhsである。

また、その1年間の繰入額は1基当り203 Rs. in Lakhsである。

2) 高炉別特別修繕の時期

第5高炉：2000年および2008年

第6高炉：2001年および2009年

#### 8-2-5 補助部門

補助部門に関する主要な事項を以下に述べる

(1) 修繕部門費

修繕費は予測のきわめて難しい費用であり、個々の要素を積み上げてゆく方法とはとりがたい。

本スタディでは、次の方法に依った。

① 新設設備分：機械装置の「固定資産取得額」の3%

② 既存設備分：I I S C Oの1986年度予算数値を参考にして推計した。

しかる後に修繕費総額（各原価部門別に）から修繕に関わる労務費を控除する方法で修繕材料費を算出した。

(2) 工場管理部門費

工場管理部門費は、人事、労働、福利厚生、生産管理技術等、多岐にわたる機能を包含しており、労務費は別にしても、もろもろの経費を積上げてゆく見積り方法はとり難い。

従ってI I S C Oの1986年度予算数値および過去の数値を参考にしつつ推計した。

結果的には労務費、減価償却費および金利を除く諸経費の規模を87 Ss. in Lakhs(年間)と推定した。

労務費、減価償却費等を含む総額としては、

第1 Step 203 Rs. in Lakhs

第2 Step 247 Rs. in Lakhsである。

(3) 輸送部門費

IISCOの1986年度予算および過去の数値を参考にして、労務費、減価償却費、金利を除く諸経費のレベルを、第1 Step 37 Rs. in Lakhs 第2 Step 50 Rs. in Lakhsと推定した。

労務費、減価償却費等を含む総額としては、

第1 Step 147 Rs. in Lakhs

第2 Step 187 Rs. in Lakhs である。

8-2-6 製造原価計算の結果

以下に品種別製造原価およびユーティリティ製造原価を示す。

詳細については巻末添付資料を参照のこと。

Table 8.2.5 品種別製造原価

(Unit : Rupees per ton)

品 種	変 動 原 価		全 部 原 価	
	100万Tノーマル時	215万Tノーマル時	100万Tノーマル時	215万Tノーマル時
Sinter	205.45	200.73	362.63	323.71
Coke	1,027.60	981.21	1,305.02	1,415.91
Hot metal	847.11	773.36	1,714.71	1,592.81
Cold pig iron	848.99	774.74	1,784.25	1,650.24
Molten steel	1,393.92	1,327.02	2,586.27	2,344.82
Ingot casting	1,590.49	1,521.34	2,866.12	2,645.25
Bloom(№1CC)	1,472.79	1,401.62	2,885.84	2,597.62
Billet(№1CC)	1,499.99	1,429.03	2,970.61	2,662.92
Billet(№2&3CC)	—	1,400.66	—	2,522.04
Bloom(Existing)	1,630.29	1,522.02	3,188.83	2,915.98
Billet(Existing)	1,705.33	1,615.45	3,454.41	3,256.65
Sheet	1,941.06	—	4,650.53	—
Galv. sheet	4,193.40	—	7,754.30	—
Merchant mill products	1,841.26	1,554.55	3,883.03	3,061.45
№1 New Bar mill products	1,648.35	1,487.81	4,175.63	3,057.01
№2 " "	—	1,494.33	—	3,093.34
Heavy structural products	1,689.87	1,586.97	3,738.46	3,399.07
<Saleable steel products>	<1,829.56>	<1,525.33>	<4,122.26>	<3,135.34>
<Saleable products>	<1,753.58>	<1,515.88>	<3,901.61>	<3,116.63>

備考: Saleable productsには外販 Pig ironおよび外販 Cokeを含む。

Table 8.2.6 ユーティリティ製造原価

(Unit: Rupees per unit)

品 種	変 動 原 価		全 部 原 価	
	第1 Stepノーマル時	第2 Stepノーマル時	第1 Stepノーマル時	第2 Stepノーマル時
Gas	113 /10 <sup>6</sup> kcal	113	12792 /10 <sup>6</sup> kcal	120.84
Electricity	0.348 /kWh	0.244	0.606 /kWh	0.484
Steam	9335 /T	91.88	10218 /T	100.89
Oxygen	0.256 /Nm <sup>3</sup>	0.180	1.407 /Nm <sup>3</sup>	1.018
Nitrogen	0.256 /Nm <sup>3</sup>	0.180	1.407 /Nm <sup>3</sup>	1.018
Industrial water	0.749 /10 <sup>3</sup> ℓ	0.672	1.880 /10 <sup>3</sup> ℓ	1.238
Filtered water	0.306 /10 <sup>3</sup> ℓ	0.214	0.927 /10 <sup>3</sup> ℓ	0.793

備考: ① Industrial water は補給水ベースである。

② Oxygen と Nitrogen は同一評価とした。

## 8-2-7 製造費明細表による原価構造の概観

Table 8.2.7 に第2 Step 正常操業時の製造費明細表を掲げる。

これによつて、粗鋼 $2,150 \times 10^3$ トン、鋼材 $2,064.5 \times 10^3$ トン生産時における原価構造のありさまを概観することが出来る。

## (1) 全 体 構 造

Gross Input 額	81,238 Rs. in Lakhs	119 %
Reused 額	(-) 12,861	(-) 19
Net Input 額	68,377	100
外販 etc 副産物	4,034	6
製 造 原 価	64,343	94
Output 額	68,377	100
製造原価の内 変動費	31,295	
"          固定費	33,048	
但し固定費には金利	4,336 Lakhs を含む。	

## (2) 原 価 構 造

### 1) ウェイトの大きな原価要素

製造原価に占めるウェイトの大きな要素を変動費、固定費別に上位3要素づつ取り出してみると次のとおりである。

但し Reused 分を除く。

<変 動 費>		<固 定 費>	
① Coking coal	25.0%	① Depreciation	27.0%
② Iron ore(incl. fine)	6.6	② Fixed material	9.7
③ Scrap(purchased)	5.4	③ Interest	6.7

なお、労務費のウェイトは5.0%である。

### 2) 副 産 物

Gross Input 額に対して副産物の Reused 額は16%にもおよび一貫製鉄所における副産物再利用の大きさを見ることが出来る。この再利用度を高めることが、原価低減に寄与する。

### 3) 外販等副産物

主要な項目は次のとおりである。

- ① 高炉滓 ( Granulated ) : 2,398 Rs. in Lakhs
- ② 粉コークス ( Coke breeze ) : 1,051 Rs. in Lakhs
- ③ 化成品工場向けガス : 356 Rs. in Lakhs

Table 8.2.7 製造費明細表(第2 Step)

215万トノ正常操業時)

Item	Quantity	Unit Price (Rs.)	Amount (10 <sup>3</sup> Rs.)	Rs./ton
Iron ore	1,2702 × 10 <sup>3</sup> ton	1375	174642	846
Iron ore fine	2204.9 "	112	246,949	1196
Lime stone	936.4 "	222.2	208,036	1008
Dolomite stone	396.0 "	195.7	77,482	375
Manganese ore fine	95.7 "	183	17,513	85
Coking coal	2394.0 "	670.7	1,605,656	777.7
Boiler coal	179.7 "	356	63,965	310
Fluorspar	8.6 "	400.7	3,460	167
Ferro alloy	245 "	895.1	219,300	1062
Ingot mold & bottom plate	7,522.5 "	6,233.7	46,893	22.7
Scrap(purchased)	171.0 "	2,030	347,130	168.1
Scrap(reused)incl.dust	290.6 "	1,436.6	417,473	202.2
Coke breeze(reused)	253.4 "	422	106,935	51.8
Gas(reused)	6,740,445 × 10 <sup>6</sup> kcal	113	761,670	368.9
Refractory	—	—	318,620	154.3
Roll	893.6 ton	24,194	21,620	10.5
Other materials	—	—	15,682.9	76.0
By product(scrap)incl.dust	(-)349.4 × 10 <sup>3</sup> ton	1,233.9	(-)431,117	(-)208.8
" (slag)	(-)1,012.0 × 10 <sup>3</sup> ton	237	(-)239,844	(-)116.2
" (gas)	(-)6,740,445 × 10 <sup>6</sup> kcal	113	(-)761,670	(-)368.9
" (gas for chemical)	—	—	(-)35,616	(-)17.3
" (coke breeze)	(-)502.5 × 10 <sup>3</sup> ton	422	(-)212,055	(-)102.7
Labour cost	13,149人	24,639	323,982	156.9
Fixed material cost	—	—	62,694.9	303.7
Depreciation	—	—	1,736,800	841.3
Interest	—	—	433,565	210.0
Reserve for BPre-lining	—	—	40,600	19.7
Other exp. (Overhead & Traffic etc)	—	—	127,523	61.8
Manufacturing cost total	2,064.5 × 10 <sup>3</sup> t		6,434,290	3,116.6

8-2-8 製造原価の感度分析

第2 Step 正常操業時のベース製造原価 (Salesable products) に対して、主要原価要素の変動が与える影響度を Table 8.2.8 に示す。

Table 8.2.8 感 度 分 析

Case	要 素	変 化 率	影 響 (Rs/t)
<Base>		-	<3,116.6>
①	投 資 額	±10%	± 105.1
②	コークス用石炭の単価	±10%	± 77.8
③	購入 Scrap の単価	±10%	± 16.8
④	鉄 鉱 石 の 単 価	±10%	± 20.4
⑤	操 業 度	-10%	+ 177.9

備考 ①: 「投資額」は減価償却費の影響のみを取り込んだ。

⑤: 固定費総額/操業度における Rs/ton の変化

## 8-3 財務分析

### 8-3-1 基本的前提条件

- (1) BURNPUR 製鉄所が、現在（1986年3月末）かかえている累積赤字（IISCO 全体では32,583 Rs. in Lakhs）の処置に関する問題は本スタディの対象外とする。
- (2) 1987年度から1992年度までに、既存状態から発生する損益に関しても本スタディの対象外とする。
- (3) 本スタディは、近代化のための投資が行なわれる1987年以降を予測の対象とする。
- (4) プロジェクトの予測期間
  - ① 1987年から2012年までの26年間
  - ② 準備および建設期間
    - 第1 Step：1987年から1992年まで
    - 第2 Step：1988年から1993年まで
  - ③ 営業期間  
1993年から2012年までの20年間  
“20年間”はSAILおよびIISCOの指示に依る。
- (5) 生産規模
  - ① 第1 Step：粗鋼100万T/Yベース
  - ② 第2 Step：# 215万T/Yベース
  - ③ 高炉改修時：# 180万T/Yベース
- (6) 計算の時点  
1986年12月、物価変動の影響は一切織り込んでいない。

### 8-3-2 既存設備の帳簿価格について

過去に支出された投資が埋没費用（Sunk Cost）であることは投資効率計算に関する初歩的知識の領域に属する。

それにも拘わらず、本スタディは敢えて既存設備の帳簿価格を投資額（一種の現物出資として）として取り込んだ。



理由は以下のとおりである。

- 1) 既に8・1・2の(9)において少し触れたように、本スタディにおける近代化計画は既存設備の有効活用を前提としている。

前後工程があい関係し、影響しあう一貫製鉄所設備においてインプットである追加投資に対応して、アウトプットである純増分生産量を定量化することは、実務的にほぼ不可能であること。

- 2) 相互にあい関連し整合する財務三表(P/L、B/S、C/F)を作成する計算技術的観点から考えて、追加投資～増分生産量のみを対象とはしがたいこと。

- 3) 残存帳簿価格の大きな部分は、IISCOで計画している1987年および1991年稼働予定のコークス炉に対する追加投資であること。

以上3つの理由から既存設備の帳簿価格を投資額に取り込んだ。

なお、それに対応した資金ソースは、一種の現物出資とみなして資本金とする。

### 8-3-3 損益計算書に関する前提条件

#### (1) 生産・販売計画

- ① 生産即販売とみなした。

但し仕掛品、半製品および製品の在庫については別途運転資本として平均的に考慮した。

- ② 立ち上がり計画

ベース・ケースでは第1 Step、第2 Stepともに、それぞれ営業初年度から正常操業度を達成出来るものと考えた。

- ③ 生産計画および販売計画をそれぞれTable 8・3・1およびTable 8・3・2に示す。

#### (2) 販売価格

IISCOの1986年度予算における販売価格をTable 8・3・3に示す。但し本スタディでは、工場出荷価格(Ex-factory)ベースで仕切ったので、販売輸送費は販売価格から控除した。

また、その他のSelling expenses(Excise duty, EGCAF, Contribution to SDFおよびJPC cess)についても控除した後のネットベース(Net sales realization)である。

但し、ストック・ヤード・エキストラ 210 Rs./T (= 300 Rs./T × 70%)  
を、コークスおよび冷銑を除いたその他の製品に付加した。

(注) EGAEF : Engineering Goods Export Assistant Fund

SDF : Steel Development Fund

JPC : Joint Plant Committee

Table 8.3.1 生産計画

(Unit: 1,000 T/Y)

年		1993	1994 ~1999	2000 ~2001	2002 ~2007	2008 ~2009	2010 2012
焼							
コ		1,334	2,816				
溶	ク	713	1,296				
冷		1,029	2,156				
溶		62.6	76				
鋼		1,036.3	2,229.6	粗鋼 1,800 ベース	1994~ 1999年 に同じ	粗鋼 1,800 ベース	1994~ 1999年 に同じ
塊		515	295				
ブ	ム (No.1CC)	285	335				
ビ	ト (No.1CC)	200	250				
ビ	ト (No.2&3CC)	0	1,270				
ブ	ル	756	603				
ビ	ッ	453.6	249.5	148		148	
シ	一	100	0	0		0	
亜	ッ キ シ	30	0	0		0	
マ	ン ト ミ ル 製 品	250	250	248		248	
No.1	新 棒 鋼 ミ ル	254	600	372		372	
No.2	"	0	700	700		700	
ヘビース	ト ラ ク タ ー ミ ル	250	250	250		250	

Table 8-3-2 販売計画(Base Case)

(Unit : 1,000 T/Y)

年	1993	1994 ~1999	2000 ~2001	2002 ~2007	2008 ~2009	2010 ~2012
生産品						
コークス(Iump)	41	0	0			
冷 錠	393	26	11			
ピ ッ ト	5.6	238.5	148			
ブ ラ ッ ク シ ー ト	70	0	0	1994~ 1999年 に同じ	2000~ 2001年 に同じ	1994~ 1999年 に同じ
亜鉛メッキシート	30	0	0			
マーチャントミル製品	250	250	248			
№1新準鋼ミル	254	600	372			
№2	0	700	700			
ヘビーストラクチャーミル	250	250	250			
合 計	939.9	2,064.5	1,729.0	2,064.5	1,729.0	2,064.5

Table 8.3.3 販売価格表( Ex-factory かつ Net ベース )

( Unit:Rs/T )

品 種	販売価格	備 考
コ ー ク ス ( Lump )	1,355	
冷 鉄	2,540	
ピ ン ン ト	3,020	
ブ ラ ッ ク シ ー ト	6,230	2 4 G
亜 鉛 メ ッ キ シ ー ト	9,800	2 4 G
マーチャントミル製 品	3,730	Rounds 22
№1 新棒鋼ミル "	3,810	Rounds 16/18
№2 " "	3,730	Rounds 22
ヘビストラクチャーミル "	4,331	{ Square 125 (40%) Angle 150×150 (30%) Joist 250×150 (30%)

品種別販売価格の適用は備考欄に示されている代表サイズに依った。

### (3) 売上原価

営業期間20年間にわたる損益計算に適用された、売上原価の概念は以下のとおりである。

- |  |
|--|
| <ul style="list-style-type: none"><li>① 品種別トン当り変動原価×年間販売数量</li><li>② 固定費年額<ul style="list-style-type: none"><li>a. 操業固定費</li><li>b. 減価償却費 ( Depreciation &amp; amortization )</li><li>c. 長短借入金金利</li><li>d. 高炉修繕引当金繰入額</li></ul></li></ul> |
|--|

従って8-2における全部原価は、20年間にわたる売上原価としては適用されない。

当該全部原価には平均金利額が含まれていることと KULTI 向けガス分譲原価に対応する固定費が控除されている等の理由に依る。

### (4) 販売輸送費

本スタディでは、損益計算を工場出荷ベースで行っているので計算の対象外とした。

### (5) 一般管理費および販売間接費

BURNPUR製鉄所の原価計算方式に倣い、既に工場管理部門費の中に織り込まれている。

### (6) 法人所得税率：50%

### (7) 繰越欠損金の繰越有効期間：8年間

### (8) Tax Incentive：とくになし

### (9) 外販副産物の売上高計上について

外販高炉滓および外販粉コークスについては、製造原価計算において副産物として控除するにとどめ、とくに改めて売上高に計上していない。

また、それに対応して売上原価にも計上していない。

外販副産物は、副産物評価単価と同一単価で売れるものと考えた。即ち外販損益はゼロと考えた。

換言すれば鋼材原価の中に外販副産物の利益分も織り込まれていると考えてよ  
い。

#### 8-3-4 資金運用表および貸借対照表に関する前提条件

##### (1) 総所要資金の年次別支払予測

総所要資金については8-1において総投資額として、既に予測されている。  
この総所要資金に関して項目別、国内・輸入調達ポーション別かつ年次別に、  
その支払金額を予測した結果がTable 8.3.4、Table 8.3.5およびTable  
8.3.6に示されている。

予測にあたっては、建設の全体スケジュールを前提にして契約時期、機器の製  
作期間、船積み時期および工事期間等を考慮した。

Table 8.3.4 投資額の年次別支払額と資金調達

(合 計) (Unit: Rs. in Lakhs)

項 目	1987	1988	1989	1990	1991	1992	1993	合 計
土 地	0	2,008	2,008	1,721	0	* 38 0	0	* 38 5,737
建 物	0	0	1,151	4,578	6,287	* 1,812 2,779	532	* 1,812 15,327
機 械 装 置	0	0	13,033	31,476	71,043	* 6,003 62,597	14,612	* 6,003 192,961
車 輛	0	0	0	54	483	* 735 2,623	2,727	* 735 5,887
予 備 品	0	0	0	0	0	3,087	2,156	5,243
エンジニアリングフィー	771	1,325	1,183	1,183	1,183	1,183	568	7,396
教 育 訓 練	0	0	0	0	10	252	38	300
操 業 指 導	0	0	0	0	0	391	80	471
開 業 準 備	37	69	59	59	59	59	28	370
(以上合計)	(808)	(3,402)	(17,434)	(39,071)	(79,065)	(* 8,588) 72,971	(20,941)	(* 8,588) 233,692
建 中 金 利	16	58	267	833	2,193	4,773	3,034	11,174
合 計	824	3,460	17,701	39,904	81,258	* 8,588 77,744	23,975	* 8,588 244,866
a&b 国内ポーション	268	2,475	11,262	26,122	50,380	* 8,588 49,408	16,137	* 8,588 156,052
c 輸入ポーション	556	985	6,439	13,782	30,878	28,336	7,838	88,814

#### < 資金調達 >

a. 資本金	268	2,475	11,262	26,122	47,640	* 8,588 29,079	0	* 8,588 116,846
b. SDF Loan	0	0	0	0	2,740	20,329	16,137	39,206
c. EXIM Loan	556	985	6,439	13,782	30,878	28,336	7,838	88,814

備考: ① \*印は既存設備の Book Value 額

② 項目別金額は固定資産等の取得額ベース

Table 8.3.5 投資額の年次別支払額と資金調達

(第1 Step)

(Unit: Rs. in Lakhs)

項 目	1987	1988	1989	1990	1991	1992	合 計
土 地	0	2,008	2,008	1,721	0	* 38 0	* 38 5,737
建 物	0	0	1,151	3,626	3,463	* 1,812 826	* 1,812 2,066
機 械 装 置	0	0	13,033	18,404	51,373	* 6,003 17,444	* 6,003 100,254
車 輛	0	0	0	0	326	* 735 151	* 735 477
予 備 品	0	0	0	0	0	3,087	3,087
エンジニアリングフィー	771	615	615	615	615	615	3,846
教 育 訓 練	0	0	0	0	10	244	254
操 業 指 導	0	0	0	0	0	391	391
開 業 準 備	37	31	31	31	31	31	192
(以上合計)	( 808)	( 2,654)	( 16,838)	( 24,397)	( 55,818)	* 8,588 22,789	* 8,588 123,304
建 中 金 利	16	44	226	635	1,631	3,297	5,849
合 計	824	2,698	17,064	25,032	57,449	* 8,588 26,086	* 8,588 129,153
a & b 国内ポーション	268	2,224	11,064	16,421	34,415	* 8,588 15,232	* 8,588 79,624
c 輸入ポーション	556	474	6,000	8,611	23,034	10,854	49,529

&lt; 資金調達 &gt;

a. 資本金	268	2,224	11,064	16,421	31,675	* 8,588 0	* 8,588 61,652
b. SDF Loan	0	0	0	0	2,740	15,232	17,972
c. EXIM Loan	556	474	6,000	8,611	23,034	10,854	49,529



Table 8.3.6 投資額の年次別支払額と資金調達

(第2 Step)

(Unit: Rs. in Lakhs)

項 目	1988	1989	1990	1991	1992	1993	合 計
土 地	0	0	0	0	0	0	0
建 物	0	0	952	2824	1953	532	6,261
機 械 装 置	0	0	13,072	19,670	45,153	14,812	92,707
車 輛	0	0	54	157	2,472	2,727	5,410
予 備 品	0	0	0	0	0	2,156	2,156
エンジン・アライングフィー	710	568	568	568	568	568	3,550
教 育 訓 練	0	0	0	0	8	38	46
操 業 指 導	0	0	0	0	0	80	80
開 業 準 備	38	28	28	28	28	28	178
(以上合計)	(748)	(596)	(14,674)	(23,247)	(50,182)	(20,941)	(110,388)
建 中 金 利	14	41	198	562	1,476	3,034	5,325
合 計	762	637	14,872	23,809	51,658	23,975	115,713
a&b 国内ボーション	251	198	9,701	15,965	34,176	16,137	76,428
c 輸入ボーション	511	439	5,171	7,844	17,482	7,838	39,285

&lt; 資金調達 &gt;

a. 資本金	251	198	9,701	15,965	29,079	0	55,194
b. SDF Loan	0	0	0	0	5,097	16,137	21,234
c. EXIM Loan	511	439	5,171	7,844	17,482	7,838	39,285

## (2) 資金調達ソース

### 1) 資本金

国内調達ポーションは、資本金と SDF Loan によって調達されるものと考えた。

資本金の比率は建中金利を除く総所要資金の 50% とした。(SAIL の指示にもとづく)

### 2) SDF Loan

国内調達ポーションの内、上記資本金で不足する部分は SDF Loan によるものとした。

なお、年次別支払予測に際しては、まず資本金を充当し、不足する年次に至って SDF Loan を借入するものと仮定した。

### 3) EXIM Loan (公的輸出信用)

輸入調達ポーションについては、EXIM Loan から調達されるものと仮定した。

## (3) 長期借入金の調達条件

以下の条件を前提とした。

なお、借入タイミングは、すべて期央と仮定した。

### 1) SDF Loan

- ① 金 利 率 : 8.0% / 年
- ② 据 置 期 間 : Commissioning から 2 年間
- ③ 返 済 期 間 : 据置期間を含む 15 年間
- ④ 返 済 方 法 : 元本均等払
- ⑤ 返済タイミング : 年 1 回期央

### 2) EXIM Loan

本スタディは、OECD ガイドラインベースに従った。

- ① 金 利 率 : 5.6% / 年
- ② 据 置 期 間 : Commissioning から 6 カ月間
- ③ 返 済 期 間 : 10 年間
- ④ 返 済 方 法 : 元本均等払
- ⑤ 返済タイミング : 年 2 回、期央および期末

3) 建中金利に関わる借入条件

本スタディにおいては、SDF Loan および EXIM Loan の建中金利は元本化され、それぞれの Loan の返済条件にしたがって返済されるものと仮定した。

(4) Net Working Capital

操業開始に伴ない、流動資産維持のために運転資金が必要となる。このための所要資金の一部は流動負債から調達され、不足分は、原則的には短期借入金から調達される。

Table 8.3.7 に操業第3年目の Net Working Capital を掲げる。

Table 8.3.7 Net Working Capital (操業第3年目)

(Unit: Rs. in Lakhs)

項 目	金 額	見 積 り の 前 提
流 動 資 産		
現 預 金	792	売上高の 0.1 カ月分
売 掛 金	7,922	" 1.0 カ月分
棚 卸 資 産	(13,957)	
原 材 料	3,169	売上高の 0.4 カ月分
予 備 品	5,243	初期在庫の維持
仕 掛 品	1,584	売上高の 0.2 カ月分 (半製品を含む)
製 品	3,961	" 0.5 カ月分
合 計	22,671	
流 動 負 債		
買 掛 金	3,961	売上高の 0.5 カ月分
納 税 引 当 金	4,974	翌年支払い
合 計	8,935	
Net Working Capital	13,736	

(5) 短期借入金

本スタディでは、短期借入金は資金運用表において、資金の源泉と用途との間のバランス項目として機能させている。

短期借入金は国内銀行から調達するものとする。その調達条件は、金利14%/年、翌年返済と仮定する。

なお、金利が18%/年に上昇した場合でも、本スタディにおけるキャッシュ・フローを前提にする限り、その損益に与える影響は非常に小さい。

(6) 高炉修繕引当金

本スタディでは、引当金として繰入れられた資金は高炉改修の時期が来るまで年8%の金利で運用されるものと仮定し、受取利息を計上した。

8-3-5 財務予測計算結果

以上の諸前提にもとづいて計算された財務予測の結果を次に示す。

Table 8.3.8 損益計算書

Table 8.3.9 貸借対照表

Table 8.3.10 資金運用表

Table 8.3.8 Profit & Loss Statement (Bass Case)

\*\* FINANCIAL STATEMENT OF BURNPUR WORKS (UNIT:LAKHS)

BASE

(LAKHS=100,000RUPEES)

PAGE 1 (87/02/13)

1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997
SALES	0	0	0	0	0	46,909	95,061	95,061	95,061	95,061
VARIABLE COST	0	0	0	0	0	24,537	49,370	49,370	49,370	49,370
MANUFACTUR.COST	0	0	0	0	0	16,482	31,295	31,295	31,295	31,295
SELLING EXP.	0	0	0	0	0	8,055	18,075	18,075	18,075	18,075
EXCISE DUTY	0	0	0	0	0	3,457	7,461	7,461	7,461	7,461
SDF	0	0	0	0	0	3,696	8,473	8,473	8,473	8,473
EGEAF	0	0	0	0	0	850	2,038	2,038	2,038	2,038
JPC	0	0	0	0	0	43	102	102	102	102
FIXED COST	0	0	0	0	0	17,927	28,651	28,651	28,651	28,651
LABOR	0	0	0	0	0	3,881	3,240	3,240	3,240	3,240
DEPRECIATIONS	0	0	0	0	0	9,220	17,368	17,368	17,368	17,368
B.F.RELINING	0	0	0	0	0	203	406	406	406	406
FIXED MATERIAL	0	0	0	0	0	3,365	6,269	6,269	6,269	6,269
OTHER FIXED EXP.	0	0	0	0	0	1,889	1,368	1,368	1,368	1,368
OPERATING COST	0	0	0	0	0	42,465	78,021	78,021	78,021	78,021
OPERATING INCOME	0	0	0	0	0	4,444	17,039	17,039	17,039	17,039
INTEREST INCOME	0	0	0	0	0	8	32	65	97	130
INTEREST PAID	16	69	267	833	2,193	7,331	7,864	7,156	6,482	5,744
SHORT TERM LOAN	0	0	0	0	0	156	156	0	0	0
SDF LOAN	0	0	0	0	0	2,491	3,136	3,081	2,905	2,664
(STEP1)	0	0	0	0	110	1,032	1,438	1,382	1,272	1,161
(STEP2)	0	0	0	0	110	828	1,699	1,699	1,633	1,503
FOREIGN LOAN	16	59	267	833	2,083	4,695	4,572	4,075	3,577	3,080
(STEP1)	16	44	226	635	1,521	2,704	2,427	2,150	1,872	1,595
(STEP2)	0	14	41	198	562	1,991	2,145	1,925	1,705	1,485
I-D-C.	16	69	267	833	2,193	3,034	0	0	0	0
(STEP1)	16	44	226	635	1,630	0	0	0	0	0
(STEP2)	0	14	41	198	562	3,034	0	0	0	0
INCOME BEFORE TAX	0	0	0	0	0	155	9,208	9,949	10,654	11,425
LOSS BROUGHT FWD.	0	0	0	0	0	0	0	0	0	0
TAXABLE INCOME	0	0	0	0	0	155	9,208	9,949	10,654	11,425
INCOME TAX	0	0	0	0	0	77	4,604	4,974	5,327	5,713
INCOME AFTER TAX	0	0	0	0	0	77	4,604	4,974	5,327	5,713
ACCUMULATED INCOME	0	0	0	0	0	77	4,681	9,656	14,983	20,695

( continued )

FINANCIAL STATEMENT OF BURNPUR WORKS (UNIT:LAKHS)

CASE BASE	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008
SALES	95,061	95,061	80,339	80,339	95,061	95,061	95,061	95,061	95,061	95,061	80,339
VARIABLE COST	49,370	49,370	41,523	41,523	49,370	49,370	49,370	49,370	49,370	49,370	41,523
MANUFACTUR. COST	31,295	31,295	26,294	26,294	31,295	31,295	31,295	31,295	31,295	31,295	26,294
SELLING EXP.	18,075	18,075	15,229	15,229	18,075	18,075	18,075	18,075	18,075	18,075	15,229
EXCISE DUTY	7,461	7,461	6,279	6,279	7,461	7,461	7,461	7,461	7,461	7,461	6,279
SDF	8,473	8,473	7,146	7,146	8,473	8,473	8,473	8,473	8,473	8,473	7,146
EGEAF	2,038	2,038	1,718	1,718	2,038	2,038	2,038	2,038	2,038	2,038	1,718
JPC	102	102	86	86	102	102	102	102	102	102	86
FIXED COST	28,651	28,651	28,651	28,651	28,651	27,598	26,680	26,680	18,915	12,140	12,140
LABOR	3,240	3,240	3,240	3,240	3,240	3,240	3,240	3,240	3,240	3,240	3,240
DEPRECIATIONS	17,368	17,368	17,368	17,368	17,368	16,815	15,397	15,397	7,632	857	857
B.F. RELINING	406	406	406	406	406	406	406	406	406	406	406
FIXED MATERIAL	6,269	6,269	6,269	6,269	6,269	6,269	6,269	6,269	6,269	6,269	6,269
OTHER FIXED EXP.	1,368	1,368	1,368	1,368	1,368	1,368	1,368	1,368	1,368	1,368	1,368
OPERATING COST	78,021	78,021	70,174	70,174	78,021	76,968	76,050	76,050	68,285	61,511	53,664
OPERATING INCOME	17,039	17,039	10,165	10,165	17,039	18,092	19,010	19,010	26,775	33,550	26,676
INTEREST INCOME	162	195	162	65	32	65	97	130	162	195	162
INTEREST PAID	5,005	4,267	3,528	2,789	2,051	1,381	975	734	493	251	65
SHORT TERM LOAN	0	0	0	0	0	0	0	0	0	0	0
SDF LOAN	2,423	2,181	1,940	1,699	1,458	1,216	975	734	493	251	65
(STEP1)	1,051	940	829	719	608	498	387	276	166	55	0
(STEP2)	1,372	1,241	1,111	980	849	719	588	457	327	196	65
FOREIGN LOAN	2,582	2,085	1,588	1,090	593	165	0	0	0	0	0
(STEP1)	1,317	1,040	763	485	208	0	0	0	0	0	0
(STEP2)	1,265	1,045	825	605	385	165	0	0	0	0	0
I.D.C.	0	0	0	0	0	0	0	0	0	0	0
(STEP1)	0	0	0	0	0	0	0	0	0	0	0
(STEP2)	0	0	0	0	0	0	0	0	0	0	0
INCOME BEFORE TAX	12,196	12,968	6,800	7,441	15,021	16,776	18,133	18,406	26,445	33,494	26,773
LOSS BROUGHT FWD.	0	0	0	0	0	0	0	0	0	0	0
TAXABLE INCOME	12,196	12,968	6,800	7,441	15,021	16,776	18,133	18,406	26,445	33,494	26,773
INCOME TAX	6,098	6,484	3,400	3,720	7,511	8,388	9,066	9,203	13,223	16,747	13,387
INCOME AFTER TAX	6,098	6,484	3,400	3,720	7,511	8,388	9,066	9,203	13,223	16,747	13,387
ACCUMULATED INCOME	26,794	33,277	36,677	40,398	47,908	56,296	65,363	74,566	87,788	104,535	117,922

( continued )

\*\* FINANCIAL STATEMENT OF BURANPUR WORKS (UNIT: LAKHS)

LA LAKHS=100,000RUPEES

CASE BASE

*** P / L ***	2009	2010	2011	2012	TOTAL
SALES	80,339	95,061	95,061	95,061	1,794,176
VARIABLE COST	41,523	49,370	49,370	49,370	981,184
MANUFACTUR-COST	26,284	31,295	31,295	31,295	591,086
SELLING EXP.	15,229	18,075	18,075	18,075	340,098
EXCISE DUTY	6,279	7,461	7,461	7,461	140,494
SDF	7,146	8,473	8,473	8,473	159,379
EGEAF	1,718	2,038	2,038	2,038	38,309
JPC	86	102	102	102	1,915
FIXED COST	12,140	12,140	12,140	12,140	448,503
LABOR	3,240	3,240	3,240	3,240	65,437
DEPRECIATIONS	857	857	857	857	225,417
B-F-RELINING	406	406	406	406	7,917
FIXED MATERIAL	6,269	6,269	6,269	6,269	122,485
OTHER FIXED EXP.	1,368	1,368	1,368	1,368	27,247
OPERATING COST	53,664	61,511	61,511	61,511	1,379,686
OPERATING INCOME	26,676	33,550	33,550	33,550	414,490
INTEREST INCDME	65	32	65	97	2,022
INTEREST PAID	0	0	0	0	64,256
SHORT TERM LOAN	0	0	0	0	311
SDF LOAN	0	0	0	0	28,855
(STEP1)	0	0	0	0	13,159
(STEP2)	0	0	0	0	15,696
FOREIGN LOAN	0	0	0	0	35,090
(STEP1)	0	0	0	0	19,472
(STEP2)	0	0	0	0	15,617
I.O.C.	0	0	0	0	11,174
(STEP1)	0	0	0	0	5,849
(STEP2)	0	0	0	0	5,325
INCOME BEFORE TAX	26,741	33,582	33,615	33,647	363,429
LOSS BROUGHT FWD.	0	0	0	0	0
TAXABLE INCOME	26,741	33,582	33,615	33,647	363,429
INCDME TAX	13,370	16,791	16,807	16,824	181,715
INCOME AFTER TAX	13,370	16,791	16,807	16,824	181,715
ACCUMULATED INCOME	121,292	148,083	164,891	181,715	

Table 8.3.9 Balance Sheet (Base Case)

FINANCIAL STATEMENT OF BURNPUR WORKS (UNIT:LAKHS)

CASE BASE	(LAKHS=100,000RUPEES)										
	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997
DEPRELNING)	0	0	0	0	0	0	203	609	1,015	1,421	1,827
CASH-IN-HAND	0	0	0	0	0	0	391	792	792	792	792
EXCESS CASH	0	0	0	0	0	0	0	8,572	21,021	32,172	43,741
ACCT. RECEIVABLE	0	0	0	0	0	0	3,909	7,922	7,922	7,922	7,922
LIQUID ASSETS	0	0	0	0	0	0	4,503	17,895	30,750	42,807	54,282
FINISHED GOODS	0	0	0	0	0	0	1,955	3,961	3,961	3,961	3,961
WDRK-IN-PROCESS	0	0	0	0	0	0	782	1,584	1,584	1,584	1,584
MATERIALS,SUPPLIES	0	0	0	0	0	0	1,564	3,169	3,169	3,169	3,169
SPARES&STORES	0	0	0	0	0	0	3,087	5,243	5,243	5,243	5,243
CURRENT ASSETS	0	0	0	0	0	0	11,890	31,852	44,707	56,264	68,239
1-LAND	0	2,008	4,016	6,737	5,737	5,737	5,737	5,737	5,737	5,737	5,737
2-BUILDINGS	0	0	1,151	6,729	12,016	14,795	15,040	14,565	14,069	13,584	13,098
3-MACHINERY	0	0	13,033	44,509	115,552	178,149	185,635	171,534	157,433	143,332	129,231
4-VEHICLES	0	0	0	54	537	3,160	5,864	5,585	5,305	5,025	4,746
5-INVENTORIES	0	0	0	0	0	3,087	2,156	0	0	0	0
6-PRE-OPERAT. EXP.	808	2,202	3,444	4,686	5,938	7,823	8,069	7,215	6,361	5,508	4,654
7-I.O.C.	16	74	841	1,174	3,366	8,140	10,589	9,471	8,354	7,237	6,119
OLD PLANT	0	0	0	0	0	8,588	8,057	7,526	6,995	6,464	5,933
FIXED ASSETS	824	4,284	21,985	61,889	149,146	229,479	241,147	221,623	204,255	186,886	169,518
ASSETS TOTAL	824	4,284	21,985	61,889	143,146	229,479	253,037	253,475	248,961	243,150	237,757
ACCOUNT PAYABLE	0	0	0	0	0	0	1,955	3,961	3,961	3,961	3,961
RESERVE FOR TAX	0	0	0	0	0	0	77	4,604	4,974	5,327	5,713
SHORT LOAN	0	0	0	0	0	0	0	0	0	0	0
CURRENT LIABILITIES	0	0	0	0	0	0	2,223	8,565	8,935	9,288	9,674
RESERVE(RELINING)	0	0	0	0	0	0	203	609	1,015	1,421	1,827
SDF LOAN	0	0	0	0	2,740	23,069	39,206	89,206	37,824	94,808	31,792
(STEP1)	0	0	0	0	0	17,972	17,972	17,972	16,890	15,207	13,825
(STEP2)	0	0	0	0	0	5,097	21,234	21,234	21,234	19,601	17,967
FOREIGN LOAN	556	1,541	7,980	21,762	52,640	80,976	83,861	74,979	66,099	67,217	48,535
(STEP1)	556	1,030	7,030	15,640	38,674	49,520	44,576	39,623	34,670	29,717	24,764
(STEP2)	0	511	950	6,121	13,966	31,456	39,285	35,356	31,428	27,499	23,771
FIXED LIABILITIES	556	1,541	7,980	21,762	55,379	104,045	123,270	114,795	104,937	93,445	81,954
LIABILITIES TOTAL	556	1,541	7,980	21,762	55,379	104,045	127,525	123,359	113,872	102,733	91,628
CAPITAL STOCK	268	2,749	14,005	40,127	87,767	125,434	125,434	125,434	125,434	125,434	125,434
RETAINED EARNING	0	0	0	0	0	0	77	4,681	9,656	14,983	20,695
EQUITY	268	2,749	14,005	40,127	87,767	125,434	125,511	130,115	135,090	140,417	146,129
LIABILITY/EQUITY	824	4,284	21,985	61,889	149,146	229,479	253,037	253,475	248,961	243,150	237,757



( continued )

FINANCIAL STATEMENT OF BURNPUR WORKS (UNIT:LAKHS)

BASE

( LAKHS=100,000RUPEES )

	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008
DEP(R)ELINING)	2,233	2,639	1,421	203	609	1,015	1,421	1,827	2,233	2,639	1,421
CASH-IN-HAND	792	792	669	669	792	792	792	792	792	792	569
EXCESS CASH	55,696	68,036	75,908	85,420	100,106	118,762	140,868	162,589	184,447	202,559	219,895
ACCT. RECEIVABLE	7,922	7,922	6,695	6,695	7,922	7,922	7,922	7,922	7,922	7,922	5,695
LIQUID ASSETS	66,642	79,389	84,693	92,987	109,429	128,471	151,002	173,130	195,394	213,912	222,680
FINISHED GOODS	3,961	3,961	3,347	3,347	3,961	3,961	3,961	3,961	3,961	3,961	3,347
WDRK-IN-PROCESS	1,584	1,584	1,339	1,339	1,584	1,584	1,584	1,584	1,584	1,584	1,339
MATERIALS,SUPPLIES	3,169	3,169	2,678	2,678	3,169	3,169	3,169	3,169	3,169	3,169	2,678
SPARES&STORES	5,243	5,243	5,243	5,243	5,243	5,243	5,243	5,243	5,243	5,243	5,243
CURRENT ASSETS	80,599	93,346	97,301	105,595	123,386	142,428	164,959	187,186	209,351	227,869	235,288
LAND	5,737	5,737	5,737	5,737	5,737	5,737	5,737	5,737	5,737	5,737	5,737
BUILDINGS	12,613	12,128	11,642	11,157	10,672	10,186	9,701	9,216	8,730	8,245	7,760
MACHINERY	115,130	101,029	86,928	72,827	58,726	44,625	30,524	16,423	9,648	9,648	9,648
VEHICLES	4,466	4,466	3,907	3,427	3,427	3,068	2,788	2,509	2,229	1,949	1,670
INVENTORIES	0	0	0	0	0	0	0	0	0	0	0
PRE-OPERAT. EXP.	3,800	2,947	2,093	1,239	385	0	0	0	0	0	0
W.D.C.	5,002	9,885	2,767	1,650	532	0	0	0	0	0	0
OLD PLANT	5,402	4,871	4,340	3,809	3,278	2,747	2,216	1,685	1,153	1,501	1,408
FIXED ASSETS	152,150	134,782	117,414	100,046	82,678	66,363	50,966	35,870	27,938	27,080	26,223
ASSETS TOTAL	232,750	228,128	214,715	205,641	206,064	208,791	215,926	222,656	237,288	254,949	261,511
ACCOUNT PAYABLE	3,961	3,961	3,347	3,347	3,961	3,961	3,961	3,961	3,961	3,961	3,347
RESERVE FOR TAX	6,098	6,484	3,400	3,720	7,511	8,388	9,066	9,203	13,228	16,747	18,387
SHORT LOAN	0	0	0	0	0	0	0	0	0	0	0
CURRENT LIABILITIES	10,059	10,445	6,747	7,068	11,471	12,349	13,027	13,164	17,183	20,708	16,734
RESERVE(ELINING)	2,233	2,639	1,421	203	609	1,015	1,421	1,827	2,233	2,639	1,421
SDF LOAN	28,776	25,760	22,744	19,729	16,713	13,697	10,681	7,665	4,649	1,633	0
(STEP1)	( 12,442)	( 11,060)	( 9,677)	( 8,295)	( 6,912)	( 5,530)	( 4,147)	( 2,765)	( 1,382)	( 0)	( 0)
(STEP2)	( 16,334)	( 14,701)	( 13,067)	( 11,434)	( 9,800)	( 8,167)	( 6,534)	( 4,900)	( 3,267)	( 1,633)	( 0)
FOREIGN LOAN	39,454	30,575	21,691	12,810	3,928	0	0	0	0	0	0
(STEP1)	( 19,812)	( 14,859)	( 9,906)	( 4,953)	( 0)	( 0)	( 0)	( 0)	( 0)	( 0)	( 0)
(STEP2)	( 19,642)	( 15,714)	( 11,785)	( 7,857)	( 3,928)	( 0)	( 0)	( 0)	( 0)	( 0)	( 0)
FIXED LIABILITIES	70,463	58,972	45,857	32,741	21,250	14,712	12,102	9,492	6,882	4,272	1,421
LIABILITIES TOTAL	80,522	69,416	52,604	39,809	32,722	27,061	25,129	22,656	24,066	24,980	18,155
CAPITAL STOCK	125,434	125,434	125,434	125,434	125,434	125,434	125,434	125,434	125,434	125,434	125,434
RETAINED EARNING	26,794	33,277	36,677	40,398	47,908	56,296	65,363	74,566	87,788	104,535	117,922
EQUITY	152,228	158,711	162,111	165,832	173,342	181,730	190,797	200,000	213,222	229,969	248,356
LIABILITY&EQUITY	232,750	228,128	214,715	205,641	206,064	208,791	215,926	222,656	237,288	254,949	261,511

( continued )

\*\* FINANCIAL STATEMENT OF BURNPUR WORKS ( UNIT:LAKHS)

( LAKHS=100,000RUPEES )

BASE

	2009	2010	2011	2012	TOTAL
*** B / S ***					
DEPORELINING)	203	609	1,015	1,421	
CASH-IN-HAND	669	792	792	792	
EXCESS CASH	228,107	247,090	264,771	282,469	
ACCT. RECEIVABLE	6,695	7,922	7,922	7,922	
LIQUID ASSETS	235,674	256,413	274,500	292,603	
FINISHED GOODS	3,347	3,961	3,961	3,961	
WORK-IN-PROCESS	1,839	1,584	1,584	1,584	
MATERIALS,SUPPLIES	2,678	3,169	3,169	3,169	
SPARES&STORES	5,243	5,243	5,243	5,243	
CURRENT ASSETS	248,281	270,870	288,487	306,560	
1.LAND	5,737	5,737	5,737	5,737	
2-BUILDINGS	7,274	6,789	6,804	5,818	
3-MACHINERY	9,648	9,648	9,648	9,648	
4-VEHICLES	1,390	1,111	831	551	
5-INVENTORIES	0	0	0	0	
6-PRE-OPERAT. EXP.	0	0	0	0	
7-I.D.C.	0	0	0	0	
OLD PLANT	1,316	1,224	1,132	1,039	
FIXED ASSETS	25,366	24,508	23,651	22,794	
ASSETS TOTAL	273,647	294,879	312,108	329,354	
ACCOUNT PAYABLE	3,347	3,961	3,961	3,961	
RESERVE FOR TAX	18,370	16,791	16,807	16,824	
SHORT LOAN	0	0	0	0	
CURRENT LIABILITIES	16,718	20,752	20,768	20,785	
RESERVE(RELINING)	203	609	1,015	1,421	
SDF LOAN	0	0	0	0	
(STEP1)	0	0	0	0	
(STEP2)	0	0	0	0	
FOREIGN LOAN	0	0	0	0	
(STEP1)	0	0	0	0	
(STEP2)	0	0	0	0	
FIXED LIABILITIES	203	609	1,015	1,421	
LIABILITIES TOTAL	16,921	21,361	21,783	22,206	
CAPITAL STOCK	125,434	125,434	125,434	125,434	
RETAINED EARNING	131,292	148,083	164,891	181,715	
EQUITY	256,726	273,517	290,325	307,149	
LIABILITY&EQUITY	279,647	294,879	312,108	329,354	

Table 8.3.10 Cash Flow Sheet (Base Case)

\*\* FINANCIAL STATEMENT OF BURNPUR WORKS (UNIT:LAKHS)

CASE BASE	[LAKHS=100+000RUPEES]											
	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	
*** C / F ***												
INCOME BEFORE TAX	0	0	0	0	0	0	155	9,208	9,949	10,654	11,425	
DEPRECIATIONS	0	0	0	0	0	0	9,220	17,368	17,368	17,368	17,368	
B.F.RELINING	0	0	0	0	0	0	203	406	406	406	406	
RELEASE(RELINING)	0	0	0	0	0	0	0	0	0	0	0	
CAPITAL STOCK	268	2,475	11,262	26,122	47,640	37,667	0	0	0	0	0	
(STEP1)	268	2,224	11,064	16,421	31,875	0	0	0	0	0	0	
(STEP2)	0	251	198	9,701	15,965	29,079	0	0	0	0	0	
(OLD PLANT)	0	0	0	0	0	8,588	0	0	0	0	0	
SOF LOAN	0	0	0	0	2,740	20,329	15,137	0	0	0	0	
(STEP1)	0	0	0	0	2,740	15,232	0	0	0	0	0	
(STEP2)	0	0	0	0	0	5,097	16,137	0	0	0	0	
FOREIGN LOAN	556	986	6,439	13,782	30,878	28,336	7,837	0	0	0	0	
(STEP1)	556	474	6,000	8,611	23,034	10,855	0	0	0	0	0	
(STEP2)	0	511	439	5,171	7,844	17,482	7,837	0	0	0	0	
SHORT LOAN	0	0	0	0	0	0	2,223	0	0	0	0	
SOURCES OF FUNDS	824	3,461	17,701	39,904	81,258	86,333	35,776	26,982	27,723	28,428	29,199	
INVESTMENTS	824	3,461	17,701	39,904	81,258	86,333	23,975	0	0	0	0	
(STEP1 PLANT)	808	2,654	13,838	24,987	55,818	22,789	0	0	0	0	0	
( I.D.C.)	16	44	226	635	1,630	3,298	0	0	0	0	0	
(STEP2 PLANT)	0	748	596	14,674	23,247	50,182	20,941	0	0	0	0	
( I.D.C.)	0	14	41	198	562	1,475	3,034	0	0	0	0	
(OLD PLANT)	0	0	0	0	0	8,588	0	0	0	0	0	
REPAY SOF	0	0	0	0	0	0	0	0	1,382	3,016	3,016	
(STEP1)	0	0	0	0	0	0	0	0	1,382	1,382	1,382	
(STEP2)	0	0	0	0	0	0	0	0	0	0	0	
REPAY FOREIGN	0	0	0	0	0	0	4,953	8,881	8,881	8,881	8,881	
(STEP1)	0	0	0	0	0	0	4,953	4,953	4,953	4,953	4,953	
(STEP2)	0	0	0	0	0	0	0	3,928	3,928	3,928	3,928	
B.F.RELINING EXP.	0	0	0	0	0	0	0	0	0	0	0	
RESERVE(RELINING)	0	0	0	0	0	203	406	406	406	406	406	
REPAY SHORT	0	0	0	0	0	0	2,223	0	0	0	0	
EXCESS CASH	0	0	0	0	0	0	8,572	12,449	11,151	11,569	11,569	
TAX	0	0	0	0	0	0	77	4,604	4,974	5,327	5,327	
WORKING CAPITAL	0	0	0	0	0	0	6,645	6,821	0	0	0	
APPLICATIONS TOTAL	824	3,461	17,701	39,904	81,258	86,333	35,776	26,982	27,723	28,428	29,199	
CASHFLOW(BEF.TAX)	-808	-9,402	-17,434	-39,071	-79,065	-81,559	-13,914	27,618	34,472	34,505	34,537	
CASHFLOW(AFT.TAX)	-808	-9,402	-17,434	-39,071	-79,065	-81,559	-13,914	27,541	29,868	29,530	29,210	
CASHFLOW( R.D.E.)	-268	-2,475	-11,262	-26,122	-47,640	-37,667	0	8,572	12,449	11,151	11,569	

( continued )

\*\* FINANCIAL STATEMENT OF BURNPUR WORKS (UNIT:LAKHS)

CASE	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008
*** C / F ***											
INCOME BEFORE TAX	12,196	12,968	6,800	7,441	15,021	16,776	18,133	18,406	26,445	33,494	26,773
DEPRECIATIONS	17,368	17,368	17,368	17,368	17,368	16,815	15,397	15,397	7,632	857	857
B.F. RELINING	406	406	406	406	406	406	406	406	406	406	406
RELEASE/RELINING)	0	0	1,624	1,624	0	0	0	0	0	0	1,624
CAPITAL STOCK	0	0	0	0	0	0	0	0	0	0	0
(STEP1)	0	0	0	0	0	0	0	0	0	0	0
(STEP2)	0	0	0	0	0	0	0	0	0	0	0
(OLD PLANT)	0	0	0	0	0	0	0	0	0	0	0
SDF LOAN	0	0	0	0	0	0	0	0	0	0	0
(STEP1)	0	0	0	0	0	0	0	0	0	0	0
(STEP2)	0	0	0	0	0	0	0	0	0	0	0
FOREIGN LOAN	0	0	0	0	0	0	0	0	0	0	0
(STEP1)	0	0	0	0	0	0	0	0	0	0	0
(STEP2)	0	0	0	0	0	0	0	0	0	0	0
SHORT LOAN	0	0	0	0	0	0	0	0	0	0	0
SOURCES OF FUNDS	29,971	30,742	26,198	26,839	32,795	33,497	38,936	34,209	34,483	34,757	29,660
INVESTMENTS	0	0	0	0	0	0	0	0	0	0	0
(STEP1 PLANT)	0	0	0	0	0	0	0	0	0	0	0
(STEP2 PLANT)	0	0	0	0	0	0	0	0	0	0	0
(OLD PLANT)	0	0	0	0	0	0	0	0	0	0	0
REPAY SDF	3,016	3,016	3,016	3,016	3,016	3,016	3,016	3,016	3,016	3,016	3,016
(STEP1)	1,382	1,382	1,382	1,382	1,382	1,382	1,382	1,382	1,382	1,382	1,382
(STEP2)	1,633	1,633	1,633	1,633	1,633	1,633	1,633	1,633	1,633	1,633	1,633
REPAY FOREIGN	8,881	8,881	8,881	8,881	8,881	8,881	8,881	8,881	8,881	8,881	8,881
(STEP1)	4,953	4,953	4,953	4,953	4,953	4,953	4,953	4,953	4,953	4,953	4,953
(STEP2)	3,928	3,928	3,928	3,928	3,928	3,928	3,928	3,928	3,928	3,928	3,928
B.F. RELINING EXP.	0	0	1,624	1,624	0	0	0	0	0	0	1,624
RESERVE/RELINING)	406	406	406	406	406	406	406	406	406	406	406
REPAY SHORT	0	0	0	0	0	0	0	0	0	0	0
EXCESS CASH	11,955	12,340	7,872	9,512	14,686	18,636	22,126	21,721	21,858	18,112	11,336
TAX	5,713	6,098	6,484	3,400	3,720	7,511	8,388	9,066	9,203	13,223	16,747
WORKING CAPITAL	0	0	-2,085	0	2,085	0	0	0	0	0	-2,085
APPLICATIONS TOTAL	29,971	30,742	26,198	26,839	32,795	33,497	38,936	34,209	34,483	34,757	29,660
CASHFLOW (BEF. TAX)	34,570	34,602	29,781	27,598	32,354	34,472	34,505	34,537	34,570	34,602	29,781
CASHFLOW (AFT. TAX)	28,857	29,504	23,297	24,198	29,634	26,962	26,117	25,471	25,366	21,380	13,034
CASHFLOW (R.O.E.)	11,955	12,340	7,872	9,512	14,686	18,636	22,126	21,721	21,858	18,112	11,336

( continued )

FINANCIAL STATEMENT OF BURNPUR WORKS (UNIT:LAKHS)

(LAKHS=100,000RUPEES)

CASE BASE

	2009	2010	2011	2012	TOTAL
INCOME BEFORE TAX	26,741	33,582	33,615	38,647	363,429
DEPRECIATIONS	857	857	857	857	225,417
B.F.RELINING	406	406	406	406	7,917
RELEASE(RELINING)	1,624	0	0	0	6,496
CAPITAL STOCK	0	0	0	0	125,434
(STEP1)	0	0	0	0	61,652
(STEP2)	0	0	0	0	55,194
(OLD PLANT)	0	0	0	0	8,588
SDF LOAN	0	0	0	0	39,206
(STEP1)	0	0	0	0	17,972
(STEP2)	0	0	0	0	21,234
FOREIGN LOAN	0	0	0	0	88,814
(STEP1)	0	0	0	0	49,529
(STEP2)	0	0	0	0	39,285
SHORT LOAN	0	0	0	0	2,223
SOURCES OF FUNDS	29,628	34,846	34,878	34,911	858,936
INVESTMENTS	0	0	0	0	253,454
(STEP1 PLANT )	0	0	0	0	123,304
( T.D.C.)	0	0	0	0	5,849
(STEP2 PLANT )	0	0	0	0	110,388
( T.D.C.)	0	0	0	0	5,325
(OLD PLANT )	0	0	0	0	8,588
REPAY SDF	0	0	0	0	39,206
(STEP1)	0	0	0	0	17,972
(STEP2)	0	0	0	0	21,234
REPAY FOREIGN	0	0	0	0	88,814
(STEP1)	0	0	0	0	49,529
(STEP2)	0	0	0	0	39,285
B.F.RELINING EXP.	1,624	0	0	0	6,496
RESERVE(RELINING)	406	406	406	406	7,917
REPAY SHORT	0	0	0	0	2,223
EXCESS CASH	14,212	18,984	17,681	17,697	282,469
TAX	13,587	13,370	16,791	16,807	164,891
WORKING CAPITAL	0	2,085	0	0	13,467
APPLICATIONS TOTAL	29,628	34,846	34,878	34,911	858,936

CASHFLOW (BEF. TAX)	27,598	32,954	34,472	77,429	429,107
CASHFLOW (AFT. TAX)	14,212	18,984	17,681	43,798	247,392
CASHFLOW ( R.O.E.)	14,212	18,984	17,681	42,377	181,715

(1) 損益計算書の概要

以下のことを読み取ることが出来る。

- ① 営業第1年目から少額ながら利益が発生し、その後も黒字が継続する。
- ② 高炉改修時には、生産量の減少に伴ない利益額は落ち込むものの、長期借入金の金利負担減の影響により黒字が続いて行く。

(2) 貸借対照表の概要

貸借対照表に関しては、Excess Cashが内部留保されたままの状態となっているために、財務比率分析をしてみても現実的な状態を示してくれない。

しかしながら、本スタディの性格上、利益処分政策にまで踏みこむ段階ではないので、貸借対照表の内容に関してこれ以上は触れないことにする。

(3) 資金運用表の概要

Table 8・3・11 に 操業開始年から20年間にわたる資金バランス(資金不足又は資金余剰)を掲げる。

Table 8・3・11 資金バランス (Unit:Rs.in Lakhs)

年	使 途	源 泉	バ ラ ン ス
1	35,776	33,553	(-) 2,223
2	18,410	26,982	8,572
3	15,274	27,723	12,449
4	17,277	28,428	11,151
5	17,630	29,199	11,569
6	18,016	29,971	11,955
7	18,402	30,742	12,340
8	18,326	26,198	7,872
9	17,327	26,839	9,512
10	18,109	32,795	14,686
11	14,861	33,497	18,636
12	11,810	33,936	22,126
13	12,488	34,209	21,721
14	12,625	34,483	21,858
15	16,645	34,757	18,112
16	18,324	29,660	11,336
17	15,416	29,628	14,212
18	15,862	34,846	18,984
19	17,197	34,878	17,681
20	17,214	34,911	17,697

高い資本金比率に支えられて、初年度こそ資金不足が生ずるが第2年目以降ずっと資金余剰が続く。高炉改修期に落ち込むが資金不足とはならない。

### 8-3-6 品種別損益（第2 Step 215万トン正常操業時）

8-2で計算された品種別全部原価を用いて正常操業時における平均化された損益を示す。

Table 8.3.12 品種別損益（第2 Step 正常操業時）

品 種	販売数量 (1,000ton)	販売価格 (Net) Rs/t	売上原価 Rs/t	損 益	
				トン当り(Rs)	金額 <sup>Rs. in</sup> Lakhs
冷 鉄	26	2,540	1,650	890	231
ピレット	238.5	3,020	3,257	(-) 237	(-) 565
マーチャントミル Products	250	3,730	3,061	669	1,673
№1 新棒鋼ミル //	600	3,810	3,057	753	4,518
№2 " "	700	3,730	3,093	637	4,459
ヘビーストラクチャーミル //	250	4,331	3,399	932	2,330
合 計	( 2,064.5)	( 3,729)	( 3,116)	( 613)	(12,646)

備考：① 当該損益は特定年次の損益ではなく、平均化された損益である。

② ピレットのみが赤字となっている。

但しピレットは、トン当り 1,405 Rs の限界利益を有している。

③ 全部原価計算における固定費の配賦計算には、種々の考え方がある

ので、当該計算結果のみによって、品種間の選択判断は出来ない。

### 8-3-7 投資効率分析(内部利益率)

Table 8.3.10のCash Flowを用いて内部利益率の計算がなされる。

Table 8.3.13にDCF table (Base Case)を示す。

Base Caseの内部利益率(IRR)	
税引後ROI	: 7.112%/年
税引前ROI	: 9.845%/年
(参考)ROE	: 7.253%/年



Table 8-3-13(1) DCF table:ROI (after tax)

87/02/13  
CASE BASE  
I-R.R. (448) = 7.112 % (ILAKHS=100,000RUPEES)

	CASH-FLOW	DIS	CASH-FLOW
0	0.000		0.000
1	-808.000		-754.354
2	-3402.000		-2965.251
3	-17434.000		-14186.906
4	-39071.000		-29683.064
5	-79065.000		-56079.228
6	-81559.000		-54007.390
7	-13913.682		-8601.752
8	27540.833		15895.913
9	29868.367		16094.720
10	29530.466		14856.134
11	29210.062		13719.286
12	28856.989		12653.586
13	28503.917		11668.921
14	23297.364		8904.232
15	24198.367		8634.542
16	28638.815		9538.850
17	26961.707		8385.476
18	26116.709		7583.372
19	25470.874		6904.803
20	25366.480		6419.943
21	21379.618		5051.664
22	13034.373		2875.334
23	14211.703		2926.899
24	18988.795		3650.129
25	17681.000		3173.917
26	43798.278		7340.224
TOTAL	247392.034		0.000

Table 8-3-13(2) DCF table:ROI (before tax)

87/02/19  
CASE BASE  
I.R.R. (447) = 9.845 % (11AKHS=100,000RUPEES)

	CASH-FLOW	DIS	CASH-FLOW
	0.000		0.000
0	-808.000		-735.582
1	-3402.000		-2819.509
2	-17434.000		-13153.835
3	-39071.000		-26836.925
4	-79065.000		-49440.408
5	-81559.000		-46428.988
6	-13913.682		-7210.725
7	27618.310		13030.274
8	34472.239		14806.264
9	34504.719		13491.929
10	34537.199		12294.255
11	34569.679		11202.888
12	34602.159		10208.394
13	29781.160		7998.626
14	27598.230		6747.992
15	32354.270		7201.857
16	34472.239		6985.571
17	34504.719		6366.470
18	34537.199		5800.410
19	34569.679		5285.505
20	34602.159		4816.304
21	29781.160		3773.739
22	27598.230		3183.692
23	32354.270		3397.824
24	34472.239		3295.781
25	34504.719		6739.299
26	77429.478		0.000
TOTAL	429106.558		0.000

Table 8.3.15(3) DCF table:ROE

(1 LAKHS=100,000RUPEES)

87/02/13 CASE	BASE	I-R-R. (440) = 7.253 %	CASH-FLOW	DIS	CASH-FLOW
0			0.000		0.000
1			-268.000		-249.876
2			-2475.000		-2151.568
3			-11262.000		-9128.202
4			-26122.000		-19740.859
5			-47640.000		-33567.676
6			-37667.000		-24745.741
7			0.000		0.000
8			8572.256		4895.695
9			12448.842		6628.848
10			11150.897		5536.133
11			11569.057		5355.338
12			11954.610		5159.579
13			12340.162		4965.805
14			7872.235		2953.634
15			9511.862		3327.470
16			14685.935		4790.050
17			18625.998		5667.363
18			22125.738		6278.589
19			21721.172		5742.374
20			21858.047		5387.775
21			18112.454		4162.606
22			11335.644		2428.981
23			14211.703		2839.317
24			18983.795		3536.232
25			17681.000		3070.820
26			42377.278		6862.314
TOTAL			181714.624		0.002

### 8-3-8 感 度 分 析

Feasibility Study においては、前提条件における諸々の要素がそれぞれに可変的かつ不確実的な側面を持っている。従って Base Case だけで当該プロジェクトの全体像を固定化して速断すべきではない。

以下に投資効率に大きな影響を与える要素を変化させて感度分析を行なった。これらのケースの内容と投資効率計算の結果を Table 8.3.14 に掲げる。

Table 8.3.14 感 度 分 析：9つのケースとその結果

ケ ー ス	ケ ー ス の 内 容	内 部 利 益 率		
		税 引 後 R O I	税 引 前 R O I	(参考) R O E
Case - 1	立ち上がり時の操業度ダウンを考慮 1993年～粗鋼ベース80万トン(80%) 1994年～ " 140万トン(65%) 1995年～ " 180万トン(84%)	6.572%	8.895%	6.407%
Case - 2	投資額に含まれる関税をゼロとみなした場合	8.301	11.781	9.128
Case - 3	機械および装置の耐用年数を10年とした場合 (Base case は13年)	7.344	9.845	7.607
Case - 4 - 1	製造変動原価が10%アップした場合	6.374	8.723	6.156
Case - 4 - 2	製造変動原価が10%低減した場合	7.827	10.920	8.320
Case - 5 - 1	操業固定費(固定費から減価償却費金利および高炉修繕引当金を除く)が10%アップした場合	6.844	9.439	6.854
Case - 5 - 2	操業固定費が10%低減した場合	7.375	10.245	7.647
Case - 6 - 1	総投資額(建中金利を除く)が10%増加した場合	6.441	8.806	6.268
Case - 6 - 2	総投資額が10%低減した場合	7.889	11.037	8.388

なお、巻末に Case - 1 および Case - 4 - 1 の計算資料を付す。

Table 8.3.15 に各ケース別の損益、資金バランスを掲げる（但し Case-1, Case-4-1, Case-5-1 及び Case-6-1）。

資金バランスについては、Case-1 では、第1年目から第3年目迄累計 153 Rs. in Crore の資金不足が生じること留意すべきである。その他のケースでは第1年目に資金不足が生じるが、第2年目以降は資金余剰となる。

損益（税引後）については、Case-1 では第1年目、第2年目に損失が発生し、第4年目で累積赤字は消える。

その他のケースでは、第1年目に損失が発生し、第2年目に累積赤字は消える。

Table 8・3・15 各ケース別損益・資金バランス総括表 (Unit:Rs. in Crore)

(Unit: Rs. in Crore)

(1) Base Case

年	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
売上高(クロス)	469	951						803	951						803		951			
損益	1	46	50	53	57	61	65	34	37	75	84	91	92	132	167	134	134	168	168	168
Cash flow balance	-22	86	124	112	112	120	123	79	95	147	186	221	217	219	181	113	142	190	177	177

(2) Sensitivity Case-1

年	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
売上高(クロス)	375	618	799	951				803	951						803		951			
損益	-46	-76	20	104	57	61	65	34	37	75	84	91	92	132	167	134	134	168	168	168
Cash flow balance	-56	-81	-16	122	167	120	123	79	95	147	186	221	217	219	181	113	142	190	177	177

(3) Sensitivity Case-4-1

年	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
売上高(クロス)	469	951						803	951						803		951			
損益	-17	38	34	38	41	45	49	21	24	59	68	75	76	117	152	121	121	152	152	152
Cash flow balance	-40	36	118	96	100	104	108	68	82	129	171	206	202	203	165	103	129	172	161	161

(4) Sensitivity Case-5-1

年	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
売上高(クロス)	469	951						803	951						803		951			
損益	-8	44	44	48	52	56	59	29	32	70	78	85	87	127	162	128	128	162	163	163
Cash flow balance	-31	66	123	106	110	114	118	73	90	141	181	216	212	213	176	108	137	184	171	172

(5) Sensitivity Case-6-1

年	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
売上高(クロス)	469	951						803	951						803		951			
損益	-13	39	37	41	45	50	54	23	27	65	75	82	83	128	167	134	134	168	168	168
Cash flow balance	-33	58	126	106	110	115	119	74	91	143	189	228	223	225	183	112	142	190	177	177

## 第 9 章 經 濟 分 析





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## 第 9 章 経 済 分 析

### 9 - 1 評価の方法 ( Evaluation Method )

BURNPUR 製鉄所の近代化計画の経済分析は、基本的には「 UNIDO Method 」と云われる、良く知られた費用便益分析の1つに基づいてなされた。この手法は世界銀行や国際金融公社などの世界の金融機関によって広く使われているものである。

「 UNIDO Method 」はかなりオーソドックスな手法ではあるが、その一方で、非常に実践的で、どのような種類のプロジェクトにも容易に適用可能で、特に鉄鋼業のような工業プロジェクトの分析には適している。

BURNPUR ・ プロジェクトはインドの国内市場への鉄の供給力の増強を目的としているものであるが、それは結局のところインドの輸入鉄鋼製品への依存度を低下させることに寄与しよう。このことから、分析モデルとしては「 輸入代替モデル 」を選択した。

「 UNIDO Method 」適用上の特徴は以下の通りである。

- a) 経済価値は Numeraire ( 計算単位 ) としての現地通貨によって表示される。
- b) 貿易財 ( Traded goods ) は潜在為替レート ( Shadow Exchange Rate ) によって換算された現地通貨によって表示される。
- c) 未熟練労働 ( Unskilled Labor ) は、潜在労務費 ( Shadow wage rate ) で計算された現地通貨で表示される。
- d) 全ての関税、税金は国民経済上の移転項目として経済価格からは除外される。

BURNPUR 製鉄所に適用された分析は上記 4 点を全て踏まえたものであるが、外部不経済 ( External diseconomy ) については、情報不足と時間的制約から検討の対象外とした。

### 9 - 2 経済分析の前提 ( Assumptions for Economic Analysis )

BURNPUR 製鉄所の近代化計画において、いかに経済資源の最適配分がなされ

るかということ、インドの国民経済的観点から検証するため、世界銀行で用いられていると同様な手法で、経済分析がなされた。この分析は「UNIDO Method」における輸入代替モデルをベースとしている。以下に分析結果を導くための前提となった事項について述べる。

#### 1. 共通項目 (General)

##### 1) 外貨換算レート (Foreign Exchange Rate)

1ルピー = 13.25円および1US\$ = 12.39ルピーの為替レートを現地通貨への換算レートとして使用した。(これらの数字は1986年7月の現地調査時における平均為替相場である)。

##### 2) 潜在為替レート (Shadow Exchange Rate)

経済分析においては、プロジェクトの費用便益を、プロジェクトから発生するインドの純経済便益 (Net economic benefits) を計測するという観点から、経済学上の機会費用 (Economic opportunity cost) によって評価し直す。このためには、財務価格に何らかの変更を必要とする。何故なら多くの項目は、例えば、関税や貿易制限などに起因するいくつかの価格のゆがみによって、真の経済価格によって表示されていないからである。インド鉄鋼公社 (SAIL) との話し合いによって、インド・ルピーは現状の理論為替レートよりも25%過大評価されているという点で合意をみた。従って、外貨ポジションをその時の外貨換算レートで現地通貨で表示した後、1.25の潜在為替係数 (Shadow exchange coefficient) を経済価格への変換のため乗じている。

##### 3) 潜在労務費 (Shadow wage rate)

西ベンガル州の非都市部における労働市場は過大な人口圧力と雇用機会の不足を主因として、インドでも最も劣悪なものに属する。インド鉄鋼公社 (SAIL) の意見に従い、未熟練労働に潜在労務費を適用することとし、財務計算上の平均労務費のおよそ40%を以て潜在労務費とした。

##### 4) 鉄鋼製品の経済価格 (Economic Prices of Steel Products)

ピレット、丸棒、形鋼、亜鉛メッキ鋼板などの鉄鋼製品の経済価格は、日本鉄鋼連盟の協力により、「日本貿易月表1986年版 (日本関税協会)」の日本からインド向FOB価格を基に経済価格 (インドの積降港のCIF価格にインド

の内陸輸送コストを加えたものに等しい)に変換した。

#### 5) 原材料の経済価格 (Economic Prices of Raw Materials)

インドで生産され、輸出可能な主要な項目については、経済価格(インドの積出港におけるFOB価格からインドの国内輸送費を控除したものに等しい)に変換した。輸入されている原材料については、潜在為替レートによって現地通貨に換算した。

### 2. 投資額の経済コスト (Economic Investment Cost)

#### 1) 一般原則 (General)

財務計算上の投資コストは、土地、土地造成、土木、構築物、機械装置、車輛、輸送・保険、関税・税金、エンジニアリング・フィー、教育訓練、操業指導、開業準備、操業準備品などの費目別に見積られている。

経済分析では、土地を除くそれぞれの費目を外貨ポーション(貿易財)とインド・ポーション(非貿易財)とに分ける。

インド・ポーションについては、更に労務費(熟練、未熟練)、貿易財(輸入要素)、非貿易財(国産要素)の原価要素にまで逆戻って細分していく。

全ての関係および税金は移転項目(Transfer item)として投資コストの中から除かれる。外貨ポーション、および貿易財については潜在為替レートを適用し、未熟練労働については潜在労務費を用いる。かくして財務計算上の投資コストは経済価格による投資コストに変換される。

詳細な経済価格による投資コストの内訳は Exhibit 9-1 に示した。

#### 2) 土地 (Land)

土地価格は、その使用区分に従って経済的観点から再評価している。

IISCO の BURNPUR 製鉄所のプロジェクト・サイトはおおまかに、工場敷地(Plant site)、滓捨て場(Slag bank)、更地(Green field)、市街地(Township)に分類される。

##### a) 工場敷地(642エーカー)

経済価値はストックヤードとしての観念的代替使用方法(Rs. 300/T)によって推定している。全ての鉄鋼製品のおよそ70%がストックヤードを通っているので、Step 2における予定生産量でもって経済価値を計算し

ている ( 2.15 百万 t.p.a  $\times$  70%  $\times$  Rs.300 / T = Rs.4,515 lacs p.a )

b) 萍捨て場 ( 272 エーカー )

萍捨て場の経済価値は、経済上の代替使用方法がないことからゼロとみなしている。

c) 更地 ( 272 エーカー )

IISCO の工場の将来の拡張のために数年前に買収された更地 ( 農地 ) は現在作付けは行われていないが、経済価値の算定に当たっては、1毛作による Paddy field の土地生産性による代替価格によって以下のように推定した。

Paddy : 800 kg / エーカー

(注1)

Rice : 800 kg  $\times$  0.6 = 480 kg / エーカー

(注2)

Profit : 480 kg  $\times$  Rs.4 / kg = Rs.1,920 / エーカー

(水使用料は情報不足により計算から除外)

Land Value :  $\frac{\text{Rs.1,920}}{14\%} \doteq \text{Rs.13,714} / \text{エーカー}$

(長期金利は14%と想定)

(注1) 精米比率

(注2) 米の現在の販売価格

更地の一部には石炭の炭層が存在するが、データ不足により経済価値の算定については、度外視した。

d) 市街地 ( 124 エーカー )

現地調査において、市街地の経済価値に関する情報が得られなかったため、IISCO が境界線に隣接した農地を買収した際に、Burdwan の special land acquisition officer によって IISCO に提示された近時の土地の平均価格 (Rs.35,000 / エーカー、但し補償および金利分を除く) を以て推定した。

3) 労務費 ( Labor Cost )

投資額の経済価値を算定するについては、各費目のインド・ポーションの以下に掲げる割合をもって熟練労働および未熟練労働とみなした。

a) 土地造成 熟練労働 8%

未熟練労働 2%

b) 土	木	熟練労働	6.4%
		未熟練労働	1.6%
c) 構	築物	熟練労働	1.6%
		未熟練労働	4%
d) 機	械装置	熟練労働	1.6%
		未熟練労働	4%
e) 据	付	熟練労働	4.8%
		未熟練労働	1.2%

a)、b)、c) は現地調査時における調査に基づく。d) は日本での経験をベースに、労務費を日本の半分にするることによって推定した。

#### 4) 用役関係 (Utilities)

インド鉄鋼公社 (SAIL) から提供された情報に基づき、電力を経済価格に変換した。買電の場合、購入価格より 8.5 パイサ / kWh の石炭に関する賦課 (税およびロイヤリティー) を控除。自家発の場合には、単価より 4 パイサ / kWh の電気税を除外した。双方の場合において、電力資源は十分に利用されており、真の経済価格を反映しているものとみなした。

#### 5) 現存設備 (Old plant)

財務分析では、現存設備を 1992 年 3 月末の簿価をもって評価し、新規設備投資額の中に計算上とりこんでいるが、経済分析では、土地を除く現存設備の価値については埋没価格 (Sunk cost) としてゼロとした。

### 3. 経済価格による操業費および修繕費 (Economic Operating & Maintenance Cost)

#### 1) 変動費 (Variable Cost)

変動費は原材料、用役などの原価要素まで逆戻って計算した。以下の変換係数が財務価格から経済価格への変換に用いられた。

Table 9.2.1 Variable Costs

Cost Element	Step 1 (1993)		Step 2 (1994-2012)	
	%	C.F.	%	C.F.
1. Iron Ore	12.23	1.30369	13.47	1.30337
2. Coal	45.93	0.96130	43.50	0.96130
3. Imported Coal	8.24	1.20000	7.80	1.20000
4. Iron Scrap	0	0.67390	8.86	0.67390
5. Limestone	5.92	0.64180	6.65	0.64050
6. Electricity	8.92	0.85057	6.39	0.83607
7. Others	18.76	1	13.33	1
Total (Weighted Ave)	100.00	(1.00131)	100.00	(0.97636)

(注) 経済価格算定上の前提

以下は上記(注)の中味 a) ~ e)

a) 鉄 鉱 石

	Fe (%)	F.O.B. (US\$/t)	Inland Freight (Rs./t)
Ore fine	60	14.74	90
High grade ore	64	19.23	90
low grade ore	60	17.25	90
Lump ore	64	19.23	90

各鉱石を混合した後、潜在為替レートにて直したFOB価格の加重平均値からインドの国内輸送費を控除し、同様に計算した財務上の数値と比較することによって変換係数を求めた。

(Economic)

Step 1  $\$16.025 \times 12.39 \times 1.25 - 90 = \text{Rs.}158.203/\text{t}$

Step 2  $\$16.021 \times 12.39 \times 1.25 - 90 = \text{Rs.}158.125/\text{t}$

(Financial)

Step 1 RS. 121.35/t

Step 2 RS. 121.32/t

\* Exchange rate @Rs.12.39/US\$



b) 石 炭

インドにおいて石炭輸出の可能性はないとの SAIL の意見に従い、インド産の石炭を非貿易財とみなした。従って財務価格より税金分を控除した価格を計算上用いた。

c) 輸 入 炭

豪州炭の C I F 価格を、経済価格 Rs. 1,244/T に変換。

d) 鉄スクラップ

FOB 価格を Rs. 1,167/T と推定し、経済価格に変換。

e) 石 灰 石

US \$ 15.0/T の FOB 価格を経済価格 Rs. 142.31/T に変換。

間接税、Steel Development Fund, Engineering Goods Export Assistance Fund, JPC fees などの売上諸税は移転項目として経済価格からは除いている。Freight Equalization Fund については、今回の分析が Ex-factory ベース（工場渡し）でなされていることから、売上諸税には含めていない。

2) 固 定 費 ( Fixed Cost )

a) 労 務 費

Muster Roll における半熟練 ( Semi-skilled ) および未熟練 ( Unskilled ) をもって未熟練労働とした。尚、Muster Roll 内の未熟練労働の割合は、現状の水準で不変であるとの前提をおいた。

b) 高炉特別修繕引当金および固定材料費

これらは設備費と同様の方法で経済価格に変換した。

c) その他固定費

その他固定費とは、その他間接経費 ( Overhead expense )、交通費 ( Travel expense ) および修理工場の用役費を意味する。用役費中の電力以外の経費については財務価格をそのまま用いた。

3) 増加運転資本 ( Incremental Working Capital )

増加運転資本については、以下の変換係数を用いた。

Table 9.2.2 Incremental working capital

Items	Step 1	Step 2
	(1993)	(1994-2012)
	C.F.	C.F.
1. Cash-in-hand	1	1
2. Account receivables	1	1
3. Finished products 1)	0.92163	0.91797
4. Work-in-progress	1	1
5. Raw materials 2)	0.92544	0.92293
6. Spares & stores 3)	1.02600	1.02600
7. Account payables	1	1
8. Reserve for tax.	1	1
9. Short loan	1	1

- (Notes) 1) Weighted average of conversion factors for sales is applied.
- 2) Weighted average of conversion factors for variable costs excluding electricity is applied.
- 3) Conversion factor which is the same with that of fixed material cost is applied.

## 4. 国民経済上の便益 ( Economic Benefits )

## 1) プロジェクトの粗便益 ( Gross Value of Project )

全ての製品価格は、工場の門前 ( At factory gate ) における経済価格 ( インドの積降港における C I F 価格に内陸輸送費を加えたもの ) に変換した。

Table 9.2.3 Economic prices of products

Products	C.I.F. Price (Rs/ton)	Inland Freight (Rs./ton)	Economic Price (Rs/ton)
1. Black plate	6,114	110	6,224
2. Galvanized sheet	6,423	110	6,533
3. Billet	3,831	110	3,941
4. Angle	5,322	110	5,432
5. Joist	5,576	110	5,686
6. Merchant bar	4,036	110	4,146
7. Bar (No.1 Mill)	4,036	110	4,146
8. Bar (No.2 Mill)	4,036	110	4,146
9. Pig iron	3,287	110	3,397
10. Lump coke	1,547	80	1,627

(adjusted by Shadow E.X. rate) (ex-factory)

2) 運転資本および残存価値 ( Working Capital & Salvage Value )

プロジェクトの経済期間の最終年において、運転資本およびプロジェクト・サイトの土地については経済的観点から残存価値を計算し、プロジェクトの便益として計上している。存続する工場設備については、他の経済目的のために転用することが不可能なことから、経済価値をゼロとした ( Scrap Valueについては本分析の計算外とした )。

9-3 計算結果 ( Results of Calculation )

9-2 において説明した前提に基づき、BURNPUR 製鉄所の近代化プロジェクトの経済分析を試みた。「経済価格による内部収益率 ( Economic Internal Rate of Return = E.I.R.R. )」を国民経済的観点からプロジェクトを評価する際の判断基準として使用した。E.I.R.R.の計算結果は、これにより、過去あるいは現存する鉄鋼プロジェクトを、国の立場から採択するかどうかをランク付けするための、相対的な判断基準である。(参考表参照)

国民経済的観点から評価した費用便益分析の示すところは以下の通りである。

(Case Base)

a) Capital Cost	<u>Financial</u> lacs	<u>Economic</u> lacs
Investment	233,692	207,524
Old plant	8,588	4,596
	<hr/> 242,280	<hr/> 212,120
b) Operating Cost (Step 2)		
Variable	49,370	30,555
Fixed	* 10,877	10,337
	<hr/> 60,247	<hr/> 40,892
* excluding depreciation and interest on loan		
c) Sales (Step 2)	95,061	86,825
(Net Cash Flow)	34,814	45,933
d) Internal Rate of Return	9.845% (before tax)	15.397%

計算結果は、JICAの企業化調査団の提示したBURNPUR 製鉄所近代化案は一応の経済性を有することを示している。現在12%前後と云われるインドの資本の機会費用( Opportunity cost of capital )を考慮すると、このプロジェクトは少なくとも、インドの国民経済における資源の最適配分のための、最低限の要求は満たしていると考えられる。

詳細な経済分析上の費用便益予測( Economic cost-benefit streams )は Exhibit 9.2 に示した。

(参考表) インドの鉄鋼プロジェクトの経済性比較

	<u>Financial</u>	<u>Economic</u>
Tata(Phase I)	17.5 %	26.5 %
Nagarjuna Steel	16.7 %	21.4 %
Bharat Forge	<u>?</u>	33 %
Bokaro(Expansion)	6.98%	<u>?</u>
Bhilai(Expansion)	negative I.R.R.	7.85%
Bihar (Sponge Iron)	<u>?</u>	16.1 %
Tata (Phase II)	14.9 %	17.3 %

## 9-4 感度分析 (Sensitivity Analysis)

財務分析と同様の条件で、それが経済分析上意味をもつ場合に限りプロジェクトの感度分析を試みた。

Table 9.4.1 Results of sensitive analysis

Sensitivity Cases	Prerequisites to Tests	Economic I.R.R. (%)	Financial I.R.R. (before tax) (%)
a) Case 1	Slowdown of production level during the starting period (1993-1995)	14.036%	8.895%
b) Case 2	No tariffs	-	11.781%
c) Case 3	Shortening depreciation term for machinery & equipment from 13 years to 10 years	-	9.845%
d) Case 4	Variable cost changes		
4-1	10% up	14.372%	8.723%
4-2	10% down	16.390%	10.920%
e) Case 5	Fixed cost changes (excl. BF relining)		
5-1	10% up	15.036%	9.439%
5-2	10% down	15.755%	10.245%
f) Case 6	Investment cost changes		
6-1	10% up	14.134%	8.806%
6-2	10% down	16.843%	11.037%

\*\* COST & BENEFIT STREAMS - MODERNIZATION OF BURNPUR WORKS (UNIT:LAKHS)

CASE BASE

(LAKHS=100,000RUPEES)

	1987	1988	1989	1990	1991	1992	1993	1994
*B* ECONOMIC INVESTMENT COSTS								
1.LAND	0	1,984	1,984	1,700	0	0	0	0
LAND VALUE	0	0	0	0	0	0	0	0
EARTH WORK	0	1,984	1,984	1,700	0	0	0	0
LABOR	0	177	177	151	0	0	0	0
SKILLED	0	161	161	138	0	0	0	0
UNSKILLED	0	16	16	14	0	0	0	0
OTHERS	0	1,807	1,807	1,549	0	0	0	0
2.BUILDINGS	0	0	1,126	4,477	6,148	2,717	520	0
CIVIL WORK	0	0	155	618	848	375	72	0
LABOR	0	0	11	46	67	31	6	0
SKILLED	0	0	10	42	61	29	6	0
UNSKILLED	0	0	1	4	6	3	1	0
OTHERS	0	0	144	571	781	343	66	0
STRUCTURES	0	0	970	3,859	5,300	2,342	448	0
LABOR	0	0	175	696	956	422	81	0
SKILLED	0	0	159	633	869	384	73	0
UNSKILLED	0	0	16	63	87	38	7	0
OTHERS	0	0	795	3,163	4,344	1,920	367	0
3.MACHINERY	0	0	11,272	27,223	61,444	54,069	12,812	0
CIVIL WORK	0	0	549	1,325	2,991	2,534	624	0
LABOR	0	0	39	94	213	187	44	0
SKILLED	0	0	35	86	193	170	40	0
UNSKILLED	0	0	4	9	19	17	4	0
OTHERS	0	0	510	1,231	2,778	2,447	580	0
MACHINERY	0	0	8,922	21,546	48,632	42,781	10,140	0
FOREIGN	0	0	5,293	12,784	28,854	25,383	6,015	0
INDIA	0	0	3,628	8,762	19,778	17,398	4,124	0
LABOR	0	0	623	1,505	3,397	2,988	708	0
SKILLED	0	0	567	1,370	3,092	2,720	645	0
UNSKILLED	0	0	56	135	305	268	64	0
OTHERS	0	0	3,005	7,257	16,381	14,410	3,415	0
TRADE GOODS	0	0	884	2,135	4,818	4,238	1,005	0
NON-TRADE	0	0	2,121	5,123	11,563	10,172	2,411	0
ERECTORIONS	0	0	1,144	2,764	6,239	5,497	1,301	0
FOREIGN	0	0	332	803	1,812	1,596	378	0
INDIA	0	0	812	1,962	4,427	3,901	923	0
LABOR	0	0	462	1,116	2,518	2,218	525	0
SKILLED	0	0	420	1,014	2,289	2,017	477	0
UNSKILLED	0	0	42	101	229	202	48	0
OTHERS	0	0	350	846	1,910	1,682	398	0
TRANSPORTAION	0	0	658	1,587	3,582	3,157	747	0
FOREIGN	0	0	493	1,190	2,687	2,358	560	0
INDIA	0	0	164	397	895	789	187	0
TAX	0	0	0	0	0	0	0	0
4.VEHICLES	0	0	0	52	468	2,549	2,650	0
VEHICLES	0	0	0	50	450	2,448	2,546	0
FOREIGN	0	0	0	0	2	12	13	0
INDIA	0	0	0	50	448	2,436	2,533	0
TRANSPORTATION	0	0	0	2	16	100	104	0
FOREIGN	0	0	0	0	0	1	1	0
INDIA	0	0	0	2	18	99	103	0
TAX	0	0	0	0	0	0	0	0
5.INVENTORIES	0	0	0	0	0	2,535	1,771	0
INVENTORIES	0	0	0	0	0	2,341	1,635	0
FOREIGN	0	0	0	0	0	1,547	1,081	0
INDIA	0	0	0	0	0	793	554	0
TRANS&INSURE	0	0	0	0	0	194	136	0
FOREIGN	0	0	0	0	0	154	108	0
INDIA	0	0	0	0	0	40	28	0
TAX	0	0	0	0	0	0	0	0
6.PRE-OPERATING	943	1,626	1,449	1,449	1,462	2,253	843	0
ENGINEERING FEE	906	1,557	1,390	1,390	1,390	1,390	667	0
FOREIGN	675	1,159	1,035	1,035	1,035	1,035	497	0
INDIA	231	397	355	355	355	355	170	0
TRAINING	0	0	0	0	13	315	48	0
TECHNICAL ASSIST	0	0	0	0	0	489	100	0
PRE-OPENING EXP.	37	69	59	59	59	59	28	0
7.OLD PLANT	0	0	0	0	0	4,596	0	0
TOTAL INVESTMENT	943	3,610	15,831	34,901	69,522	68,718	18,595	0

## \*\* COST &amp; BENEFIT STREAMS - MODERNIZATION OF BURNPUR WORKS (UNIT:LAKHS)

PAGE 1

CASE BASE	(ILAKHS=100,000RUPEES)										
	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997
=====											
*A* ECONOMIC PROFITS OF PROJECT											
1.GROSS VALUE OF PROJECT	0	0	0	0	0	0	41,714	86,825	86,825	86,825	86,825
2.SALVAGE VALUE WORKING CAPITAL PLANT VALUE	0	0	0	0	0	0	0	0	0	0	0
TOTAL BENEFITS	0	0	0	0	0	0	41,714	86,825	86,825	86,825	86,825
=====											
*B* ECONOMIC INVESTMENT COSTS											
1.LAND	0	1,984	1,984	1,700	0	0	0	0	0	0	0
2.BUILDINGS	0	0	1,126	4,477	6,148	2,717	520	0	0	0	0
3.MACHINERY	0	0	11,272	27,223	61,444	54,069	12,812	0	0	0	0
4.VEHICLES	0	0	0	52	468	2,549	2,650	0	0	0	0
5.INVENTORIES	0	0	0	0	0	2,535	1,771	0	0	0	0
6.PRE-OPERATING	943	1,626	1,449	1,449	1,462	2,253	843	0	0	0	0
7.OLD PLANT	0	0	0	0	0	4,596	0	0	0	0	0
TOTAL COSTS	943	3,610	15,831	34,901	69,522	68,718	18,595	0	0	0	0
=====											
*C* ECONOMIC PRODUCTION & MAINTENANCE COSTS											
1.VARIABLE COST	0	0	0	0	0	0	16,503	30,555	30,555	30,555	30,555
2.FIXED COST	0	0	0	0	0	0	7,745	10,336	10,336	10,336	10,336
LABOR (	0)(	0)(	0)(	0)(	0)(	0)(	3,035)(	2,537)(	2,537)(	2,537)(	2,537)(
B.F.RELINING COS (	0)(	0)(	0)(	0)(	0)(	0)(	0)(	0)(	0)(	0)(	0)(
FIXED MATERIAL (	0)(	0)(	0)(	0)(	0)(	0)(	3,452)(	6,432)(	6,432)(	6,432)(	6,432)(
OTHER FIXED EXP. (	0)(	0)(	0)(	0)(	0)(	0)(	1,258)(	1,367)(	1,367)(	1,367)(	1,367)(
3.INCREMENTAL WORKING CAPITAL	0	0	0	0	0	0	4,772	4,321	0	0	0
TOTAL COSTS	0	0	0	0	0	0	29,020	45,213	40,892	40,892	40,892
=====											
*D* NET BENEFITS	-943	-3,610	-15,831	-34,901	-69,522	-68,718	-5,901	41,612	45,934	45,934	45,934
=====											

## \*\* COST &amp; BENEFIT STREAMS - MODERNIZATION OF BURNPUR WORKS (UNIT:LAKHS)

PAGE 2

CASE BASE	(1 LAKHS=100,000RUPEES)										
	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008
*A* ECONOMIC PROFITS OF PROJECT											
1.GROSS VALUE OF PROJECT	86,825	86,825	73,213	73,213	86,825	86,825	86,825	86,825	86,825	86,825	73,213
2.SALVAGE VALUE	0	0	0	0	0	0	0	0	0	0	0
WORKING CAPITAL	0	0	0	0	0	0	0	0	0	0	0
PLANT VALUE	0	0	0	0	0	0	0	0	0	0	0
TOTAL BENEFITS	86,825	86,825	73,213	73,213	86,825	86,825	86,825	86,825	86,825	86,825	73,213
*B* ECONOMIC INVESTMENT COSTS											
1.LAND	0	0	0	0	0	0	0	0	0	0	0
2.BUILDINGS	0	0	0	0	0	0	0	0	0	0	0
3.MACHINERY	0	0	0	0	0	0	0	0	0	0	0
4.VEHICLES	0	0	0	0	0	0	0	0	0	0	0
5.INVENTORIES	0	0	0	0	0	0	0	0	0	0	0
6.PRE-OPERATING	0	0	0	0	0	0	0	0	0	0	0
7.OLD PLANT	0	0	0	0	0	0	0	0	0	0	0
TOTAL COSTS	0	0	0	0	0	0	0	0	0	0	0
*C* ECONOMIC PRODUCTION & MAINTENANCE COSTS											
1.VARIABLE COST	30,555	30,555	25,672	25,672	30,555	30,555	30,555	30,555	30,555	30,555	25,672
2.FIXED COST	10,336	10,336	11,694	11,694	10,336	10,336	10,336	10,336	10,336	10,336	11,694
LABOR	( 2,537)	( 2,537)	( 2,537)	( 2,537)	( 2,537)	( 2,537)	( 2,537)	( 2,537)	( 2,537)	( 2,537)	( 2,537)
B.F.RELINING COS	( 0)	( 0)	( 1,358)	( 1,358)	( 0)	( 0)	( 0)	( 0)	( 0)	( 0)	( 1,358)
FIXED MATERIAL	( 6,432)	( 6,432)	( 6,432)	( 6,432)	( 6,432)	( 6,432)	( 6,432)	( 6,432)	( 6,432)	( 6,432)	( 6,432)
OTHER FIXED EXP.	( 1,367)	( 1,367)	( 1,367)	( 1,367)	( 1,367)	( 1,367)	( 1,367)	( 1,367)	( 1,367)	( 1,367)	( 1,367)
3.INCREMENTAL WORKING CAPITAL	0	0	-1,997	0	1,997	0	0	0	0	0	-1,997
TOTAL COSTS	40,892	40,892	35,369	37,366	42,889	40,892	40,892	40,892	40,892	40,892	35,369
*D* NET BENEFITS	45,934	45,934	37,844	35,847	43,936	45,934	45,934	45,934	45,934	45,934	37,844



## \*\* COST &amp; BENEFIT STREAMS - MODERNIZATION OF BURNPUR WORKS (UNIT:LAKHS)

	CASE BASE				TOTAL
	2009	2010	2011	2012	
(1LAKHS=100,000RUPEES)					
=====					
*A* ECONOMIC PROFITS OF PROJECT					
1.GROSS VALUE OF PROJECT	73,213	86,825	86,825	86,825	1,636,945
2.SALVAGE VALUE	0	0	0	45,798	45,798
WORKING CAPITAL	0	0	0	35,534	35,534
PLANT VALUE	0	0	0	10,264	10,264
-----					
TOTAL BENEFITS	73,213	86,825	86,825	132,623	1,682,742
=====					
*B* ECONOMIC INVESTMENT COSTS					
1.LAND	0	0	0	0	5,668
2.BUILDINGS	0	0	0	0	14,987
3.MACHINERY	0	0	0	0	166,820
4.VEHICLES	0	0	0	0	5,719
5.INVENTORIES	0	0	0	0	4,306
6.PRE-OPERATING	0	0	0	0	10,024
7.OLD PLANT	0	0	0	0	4,596
-----					
TOTAL COSTS	0	0	0	0	212,120
=====					
*C* ECONOMIC PRODUCTION & MAINTENANCE COSTS					
1.VARIABLE COST	25,672	30,555	30,555	30,555	577,521
2.FIXED COST	11,694	10,336	10,336	10,336	209,566
LABOR	( 2,537)	( 2,537)	( 2,537)	( 2,537)	( 51,238)
B.F.RELINING COS	( 1,358)	( 0)	( 0)	( 0)	( 5,430)
FIXED MATERIAL	( 6,432)	( 6,432)	( 6,432)	( 6,432)	( 125,668)
OTHER FIXED EXP.	( 1,367)	( 1,367)	( 1,367)	( 1,367)	( 27,230)
3.INCREMENTAL WORKING CAPITAL	0	1,997	0	0	9,093
-----					
TOTAL COSTS	37,366	42,889	40,892	40,892	796,180
=====					
*D* NET BENEFITS	35,847	43,936	45,934	91,731	674,442
=====					

87/02/05  
CASE BASE

(1LAKHS=100,000RUPEES)

I.R.R. (520) = 15.397 %

	CASH-FLOW	DIS CASH-FLOW
0	0.000	0.000
1	-942.925	-817.113
2	-3609.779	-2710.757
3	-15830.905	-10301.981
4	-34900.862	-19681.407
5	-69521.981	-33974.035
6	-68718.004	-29100.505
7	-5900.848	-2165.456
8	41612.436	13233.147
9	45933.551	12658.289
10	45933.551	10969.328
11	45933.551	9505.720
12	45933.551	8237.397
13	45933.551	7138.303
14	37844.378	5096.492
15	35847.023	4183.387
16	43936.196	4443.267
17	45933.551	4025.455
18	45933.551	3488.350
19	45933.551	3022.908
20	45933.551	2619.570
21	45933.551	2270.048
22	37844.378	1620.732
23	35847.023	1330.357
24	43936.196	1413.001
25	45933.551	1280.133
26	91731.089	2215.371
TOTAL	674442.481	0.000

## 第 10 章 結論と勧告



## 第10章 結論と勧告

10-1 我々 JICA F/S 調査団は、BURNPUR 製鉄所近代化プロジェクトについて、以上に報告した様に各方面にわたる詳細な検討を行なった。検討に当っては、現地調査等により得られたデータ、情報を活用すると共に、幾つかの前提ないし仮定を設けて検討、作業を進めた。

我々調査団の検討結果は次の通りである。

- (1) BURNPUR 製鉄所を粗鋼年産 215 万 T 規模の新鋭製鉄所として近代化することは技術的には充分可能である。
- (2) 財務および経済分析の結果は、第 8 章、第 9 章に示す通りである。我々の結論は、本プロジェクトは必ずしも十分な収益性と経済性を有するとは言えないが、IISCO 自身の努力およびインド政府の強力な支援があればフィージビリティなしとは言えない。
- (3) 従って、本プロジェクトを実施するかどうかについては、インド政府の政策的尺度による判断が加えられて決定されるべきものと考えられる。

10-2 本プロジェクトを実施に移す場合には是非とも必要と考えられる事項およびプロジェクトの経済性に大きく影響を与えると思われる主要な事項を以下に列挙する。

- (1) 新しい設備と技術によって近代化された製鉄所を計画通り操業するためには、従業員（技術者、技能者）に対する各種の方策を活用した事前の徹底した教育訓練が必要不可欠である。

これはまた、順調を立ち上がりに影響し、このプロジェクトの経済性にも影響する。従って、工事計画と同時に早い時期に教育訓練計画を策定して実行する必要がある。

- (2) 新しい設備と技術を駆使して歩留の向上、効率の高い操業を安定的に維持するためには、適確な指揮命令の伝達を確保するため、簡素な一貫管理組織を形成する必要がある。

また、長期的な設備保全計画の策定と、設備保全の実施体制の整備が必要である。これらがないと、せっかくの新鋭設備も数年を経ないうちに老朽化してしまふ。

- (3) 製鉄所の部品製作、機械修理のための関連企業を育成するようインド政府は必

要な施策を講ずべきである。

- (4) 現在の I I S C O の膨大な累積赤字と、建設期間中における古い既存設備の稼働を考慮し、建設の開始時期についてはできるだけ早期が望ましく、従って、本プロジェクトの決断は早期になされる必要がある。
- (5) 建設中のコストオーバーランは、本プロジェクトの収益性を悪化させるので、工期の遅れを防ぎ、計画通りの施行を保證できるよう建設発注に当って留意する必要がある。
- (6) 輸入する設備機器に対する関税は、設備費負担を加重し、本プロジェクトの収益性を悪化させる要素ともなっているので、インド政府において何らかの関税減免措置を講ずることが望ましい。
- (7) 実行計画を策定する際には、建設予定地について十分な土地調査（ボーリングによる）と地形測量を行なう必要がある。

## 資 料

### (第6章 マネジメント)

1. Management-Managerial Practices in Japanese Steel Industry
2. Memorandum "For IISCO BURNPUR\*Works"

### (第8章 財 務 分 析)

1. Details of Total Investment
2. Details of Variable Cost (Step 1, 1.0 MT)
3. Details of Variable Cost (Step 2, 2.15 MT)
4. Details of Full Cost (Step 1, 1.0 MT)
5. Details of Full Cost (Step 1, 2.15 MT)
6. Financial Analysis
  - (1) Base Case
  - (2) Sensitivity Analysis Case-1
  - (3) Sensitivity Analysis Case-4-1





## MANAGEMENT - MANAGERIAL PRACTICES IN JAPANESE STEEL INDUSTRY

It is widely known among steel men the world over that the Japanese steel industry has been registering an exceptionally steady growth ever since its miraculous revival from the postwar annihilation.

### Growth in Japan's crude steel production

(in millions of metric tons)

1950	5.3
1960	23.2
1970	92.4
1980	107.4

Numerous factors lie behind the rapid growth. One of the most important contributing factors is, in our view, the concept of quality control which was introduced from the United States soon after World War II having been infiltrated deep into the business concerns from the management to the rank and file.

To help you grasp a clearer image of the organization and personnel stated in Table 7.1.3 (Chapter 7-1) the general profile of the "Japanized" philosophy of management is briefed below.

It should be noted here that this is just the Japanized management philosophy "tailored to the disposition of Japanese people". In India, SAIL, IISCO and Burnpur Works, therefore, it must be modified to the one that fits the disposition of Indian people, SAIL's people, IISCO's people and Burnpur's people.

For this modification, exhaustive effort must be continued on a try-and-error basis.

#### (1) Basic attitude toward "Control"

Prior to entering the specific consideration, we would like to stress three points concerning our basic attitude towards "control". The last two relate to a problem that can be discussed as the differences in the social

climate and national character but involve our basic stance on the problem of control.

1) No royal road to control

Strenuous effort has been directed in Japan in pursuit of new control techniques. "TQC" developed by "Japan Science and Technology Federation" is one of the most famous control techniques. What is herein termed "control" is "to do common things in a common but scrupulous way" and accumulating everyday efforts is the sole shortcut to successful control.

Even in Japan, however, many people still pin their hope to "control techniques" and "TQC" for 'miracle' or 'magic'.

Here, please look at Fig. 6.0.1. Making efficiently products of quality tailored to users' specification by raising the control level reduces the direct manufacturing cost but increases the control cost and does not always cut back the overall cost. The best way of control varies with different countries, companies, works and offices and the direct importation of control techniques from overseas bears less fruit unless they are modified and adapted to the recipient's own disposition. Further, even though the recipient successfully establishes a good way of control, it often goes off an optimum level too soon unless it is adjusted to the changing situation.

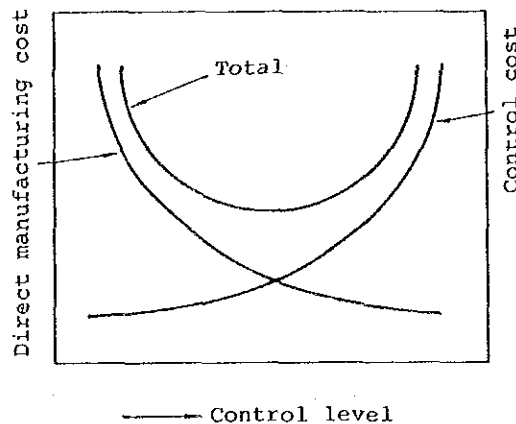


Fig. 6.0.1 Control level vs. cost

To improve control practices, what is needed most is to accumulate everyday efforts since there is no royal road to control.

2) Greater stress on "bottom up" flow

Information and instructions flow in two directions: the one from top to bottom ("top down" flow) and the other from bottom to top ("bottom up" flow). Generally speaking, the "bottom up" flow receives greater weight in Japan in controlling variables compared with the United States and European countries. This is because (1) operators and young engineers in Japan was very positive for the improvement of operational practices and (2) the rank and file on the front have the deepest knowledge of what is going on shop work or desk work.

In Japan, the management staff tries to make decisions in conformity with the actual conditions by hearing their subordinates attentively, a practice that has borne fruit under various situations.

3) Emphasis on training

Industrial training consists of on-the-job training and off-the-job training, each being promoted vigorously in Japan. The reason for this is explained in various ways but one thing certain is that it is economically beneficial. Without industrial training, it would be impossible to attain a high level of operational achievements.

Such an industrial training must be a real one wherein the expertise, experience and know-how of superiors are unreservedly transferred to their subordinates.

(2) Control Categories and Steps

1) Classification by control range

For an integrated steelworks where manufacturing processes are complicated and involve many people, it

is a very difficult problem what steps are to be taken to raise the control level. A close observation of Fig. 6.0.2 will reveal that control practices can be classified into four categories.

- a) Control of individual units of equipment  
This is to control individual equipments that comprise each process, e.g. reheating furnace.
- b) Control of individual processes  
This is to control individual processes, such as ironmaking, steelmaking and hot rolling, that comprise the integrated iron- and steelmaking process.
- c) Integrated control over individual functions  
This is to control in an integrated manner individual functions such as production control and quality control.
- d) Integrated technical control  
This involves a works-wide integrated control of variables such as overall production costs. The scope of control spreads out and the nature of control becomes sophisticated in the descending order from a) to d).

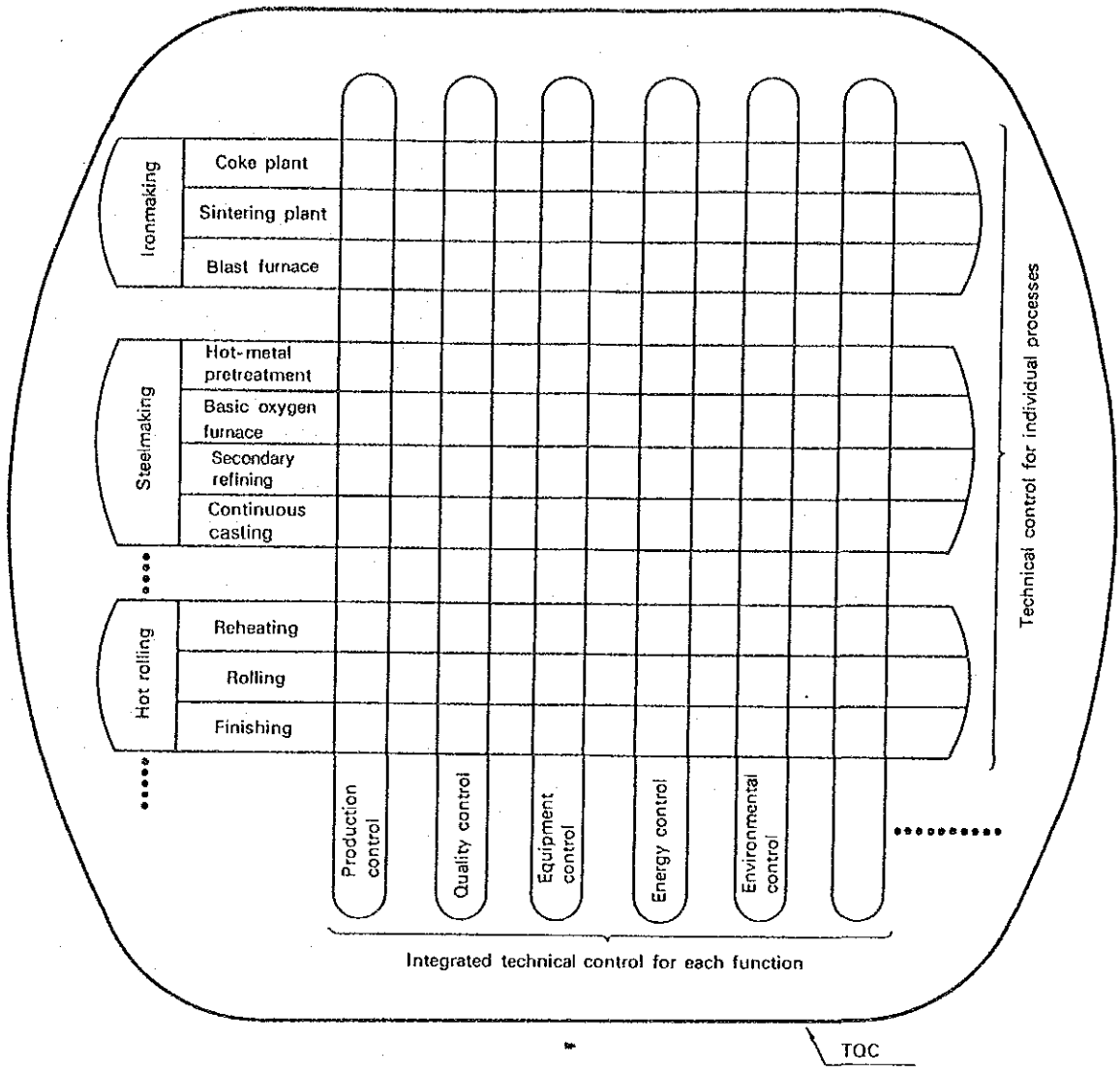


Fig. 6.0.2 Classification of technical control elements

## 2) Responsibilities and results

The ultimate purpose of "control" is to improve operating efficiency. Though qualitative, the relationship between responsibilities and results is illustrated in Fig. 6.0.3 for each control category. The relative importance of the duty and responsibility of each control level is indicated by area in this figure. As the sophisticatedness of control increases, upper-level managers assume greater responsibilities.

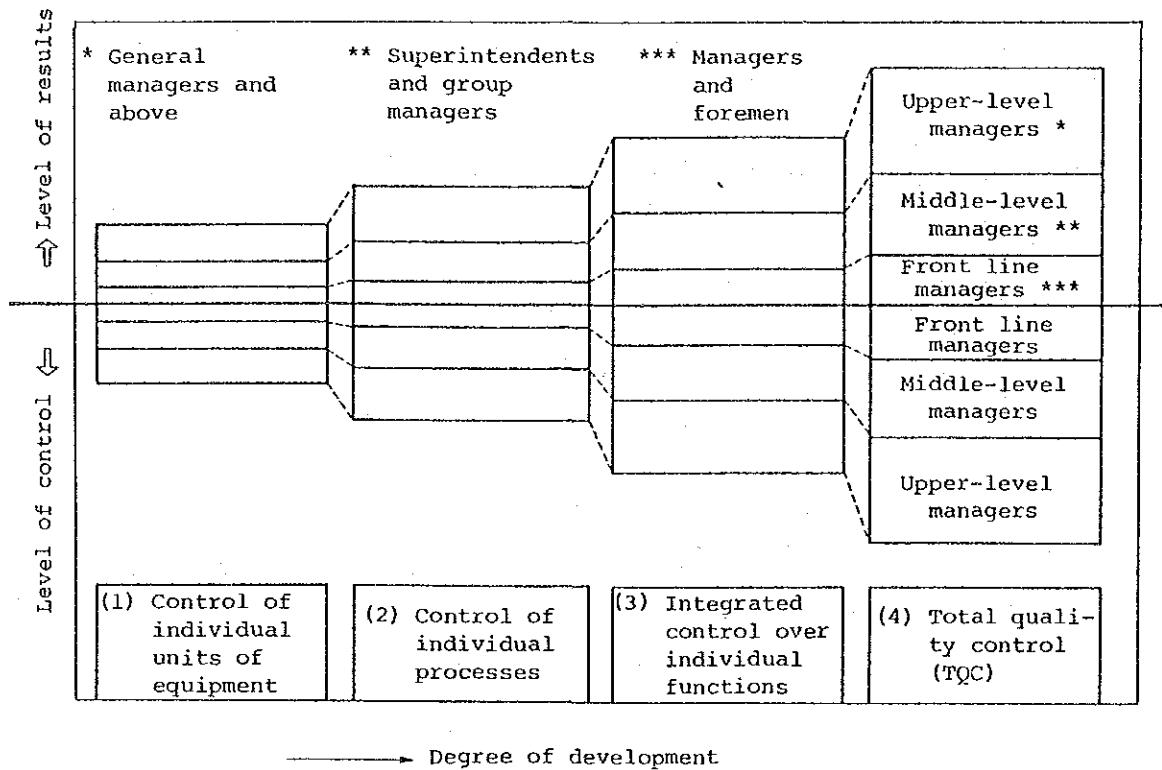


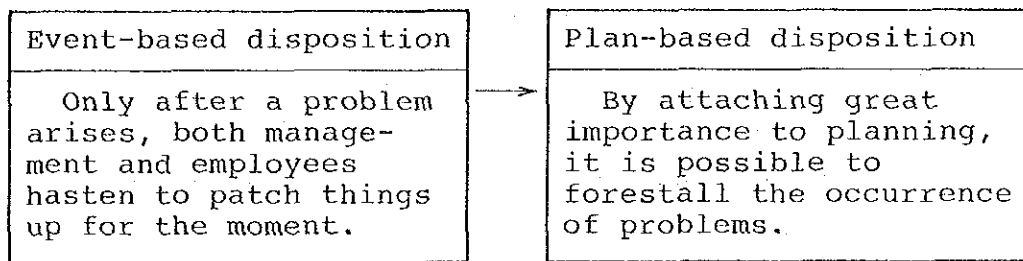
Fig. 6.0.3 Responsibilities for control and results

(3) Fundamentals of Control

1) "P-D=C-A Circle" as a basic philosophy

The most important basic philosophy of control is to rotate the "Circle of Control" shown in Fig. 6.0.4.

By securely rotating the circle for all variables that need to be controlled, it is possible to control them with improved accuracies and thereby improve the disposition of a steelworks as a whole as shown below.



If a steelworks is reoriented to a plan based one, the operating policy of the top management can be infiltrated into employees working in the forefront, thereby making it possible for all people in the steelworks to reach a consensus about the problem they face.

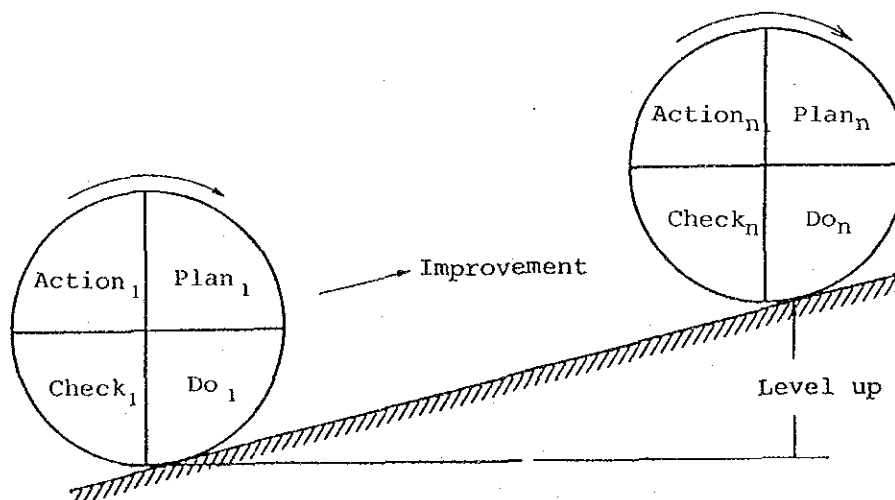


Fig. 6.0.4 Circle of control

Scrupulously rotating the P-D-C-A circle, though seemingly an easy task, is very difficult and requires exhaustive efforts especially for a steelworks where many people and processes are involved. Senior managers, in particular, need to recognize and come to grips with this in a tenacious manner.

2) Key points

The key points needed in rotating the P-D-C-a circle are discussed hereunder.

a) Spiral-up

A slow but steady pace must be sought until the custom of securely rotating the P-D-C-A circle is firmly established in the workshop. Seeking perfection from the outset may cause a pause halfway. We recommend what we call "Spiral Up" wherein the first cycle is rotated while neglecting imperfections to some degree, and faults, if any, are corrected from the second cycle onwards.

b) 5Ws and 1H

A number of people of various job classes are usually involved in a task. To fulfill the task without any fault, it is important to pre-arrange "5Ws and 1H" - What, Why, When, Who, Where and How. Especially "who", that is, the person responsible, must be clarified in advance.

c) Check & action

It is to be especially noted here that the P-d-C-A circle often gets into malfunction because of only an instruction being given without subsequent checkup and action steps. The blame rests with senior managers.



It is also to be noted that when checking the result of a thing done, the way or manner in which the thing has been done should also be checked and the way or manner must be corrected if necessary based on the result checked, rather than checking the result alone. Another consideration of similar importance is to pre-schedule the frequency of checkup, reckless checkup of numerous items is only timeconsuming. A priority-based check-up frequency must be worked out.

d) Data-based study and discussion - "Fact Control"

A qualitative discussion without quantitative data or with raw data yet to be analyzed must be avoided. Data acquisition and processing may sometimes require a large sum of expenditure but if the data is of crucial importance such an expenditure must not be saved.

e) Large P-D-C-A and small P-D-C-A

If a problem to be solved is of major importance, it is divided into small elements. A long period of time is often taken to solve problems in some cases because of sticking to the small circle alone without giving due attention to the major problem and in other because of problem-solving activities being not well timed among individual participants involved.

As the scope of control and the sophisticatedness of problem increase, greater attention must be given to this point.

3) Approach to total participation

A thorough control requires concerted cooperation of all parties concerned. To meet this requirement, use must be made of various approaches. A few approaches most commonly used in Japan are shown below. These may not be new, but implementing them efficiently and

periodically over a long period of time requires considerable effort.

a) Meeting

Meetings are indispensable to rotate the P-D-C-A circle. Daily, weekly and monthly meetings are to be held and steered efficiently with membership and frequency adjusted to the control item involved.

Such meetings sometimes offer a forum of OJT (on-the-job training) but separately providing a training course may be worthwhile if situation requires to do so.

b) Notice

For important control items, a control chart (this is a very important information to give employees a clearcut image of the change with time in each control item) is displayed in each workshop and meeting room to inform all persons involved of the results thus far achieved and thereby arouse their interest. The way of such notification is improved from time to time as necessary.

c) "Campaign"

If it becomes necessary to rotate the P-D-C-A circle for a limited period to solve an important problem, all-out effort must be concentrated recognizing the problem as the one relevant to all workshops concerned. In such instances, a leader is selected to take initiative of the group activities and other special approaches are tried, including giving the group activities a nickname "MEHTA-PROJECT", for example, drafting and displaying slogans together with control charts and holding a special meeting the top management attends.

d) Incentive

It is also important to grant some incentive in the form of commendation or others to those groups and individuals who have produced excellent results.

## Memorandum "For IISCO Burnpur Works"

Thank you very much for your kind courtesy extended to us during our stay in Burnpur. Before going back to Japan, we ourself with to comment our very frank views of IISCO Burnpur Works for its future, which, please allow us if we misunderstand and or haven't understood the real situation of IISCO in our such limited short study of our limited stay in IISCO.

### 1. Summary

In short, there has been "Lack of Management on long term basis" in IISCO Burnpur Works.

Namely, although it is the fact that even very old equipments could have been operated because of which, consideration how to prevent relative inferiority of product quality and relative increase of production cost has been neglected in the long term management strategy up till now. In other words, the fundamental improvement, the revamping and the replacement of production equipments haven't been done. If you look at the actual situation of steel industry of Pittsburgh (which was Mecca of steel industry of U.S.A.), you can easily understand that "Lack of Management on long term strategy basis" has caused drop down of international competitiveness.

### 2. To implement Modernization

Top management people of steel industry are vulnerable to think following in case of installing brand-new equipment, that is:

"If only new equipments are installed, expected quality and production could be achieved and accordingly productivity would be increased and high competitiveness could be secured." However, to pay attention only to equipment (hard) by neglecting the following production technology (soft) which we will mention here, hasn't been achieved high productivity in the expected learning curve, which example of steel industry are too many to be counted in

the world. Unless special and urgent attention should be paid to improvement of "soft", the future of IISCO Burnpur Works would be very dark only in the replacement of "hard" of modernization.

2.1 Frankly speaking, in IISCO, "Arrangement, putting in order and Cleaning" hasn't been well done at all which we cannot compare with around 30 steel works which we have ever seen all over the world.

In IISCO, we think that we cannot say that this is only due to old facility.

For example, above "Arrangement, Putting in order and Cleaning" are nothing in IISCO, except some area in front of the major road. As there is no open space in works, workers cannot work safely which couldn't achieve high productivity. Also, control of spare-parts are not well done, therefore, workers have to find-out the same whenever necessary by paying much money and time.

## 2.2 Instrumentation System

One of the most important items not only for steel works but also for company management is to improve the instrumentation system. However, in IISCO, weighing machine hasn't been arranged to achieve the strict yield control. For example, weighing machine for ingot of bloom mill hasn't been used for a long time. Also, important instruments such as thermometer/flow meter haven't been utilized (or not existence) for a long time.

It seems to us that energy problem hasn't been considered seriously even while that actually such lack of energy causing stop of production line and decrease of yield. It is this steel works that really is in need of campaign of saving energy. It might be the most important and the biggest item for IISCO to introduce the concept of instrumentation.

### 2.3 The mechanization and automation of the operation

The change from the manual operation into the mechanized and automatic operations would be badly needed for IISCO, from the view points of not only the decrease of the number of persons, but also the improvement of operational circumstances, improvement of productivity, and improvement of operational accuracy and correctness. It is one example that there are still remaining in IISCO Burnpur Works so many operations by heavy manual labours under very high temperature conditions which have caused much obstructions for the safety and the productivity, and have brought the deterioration of the quality in a narrow sense.

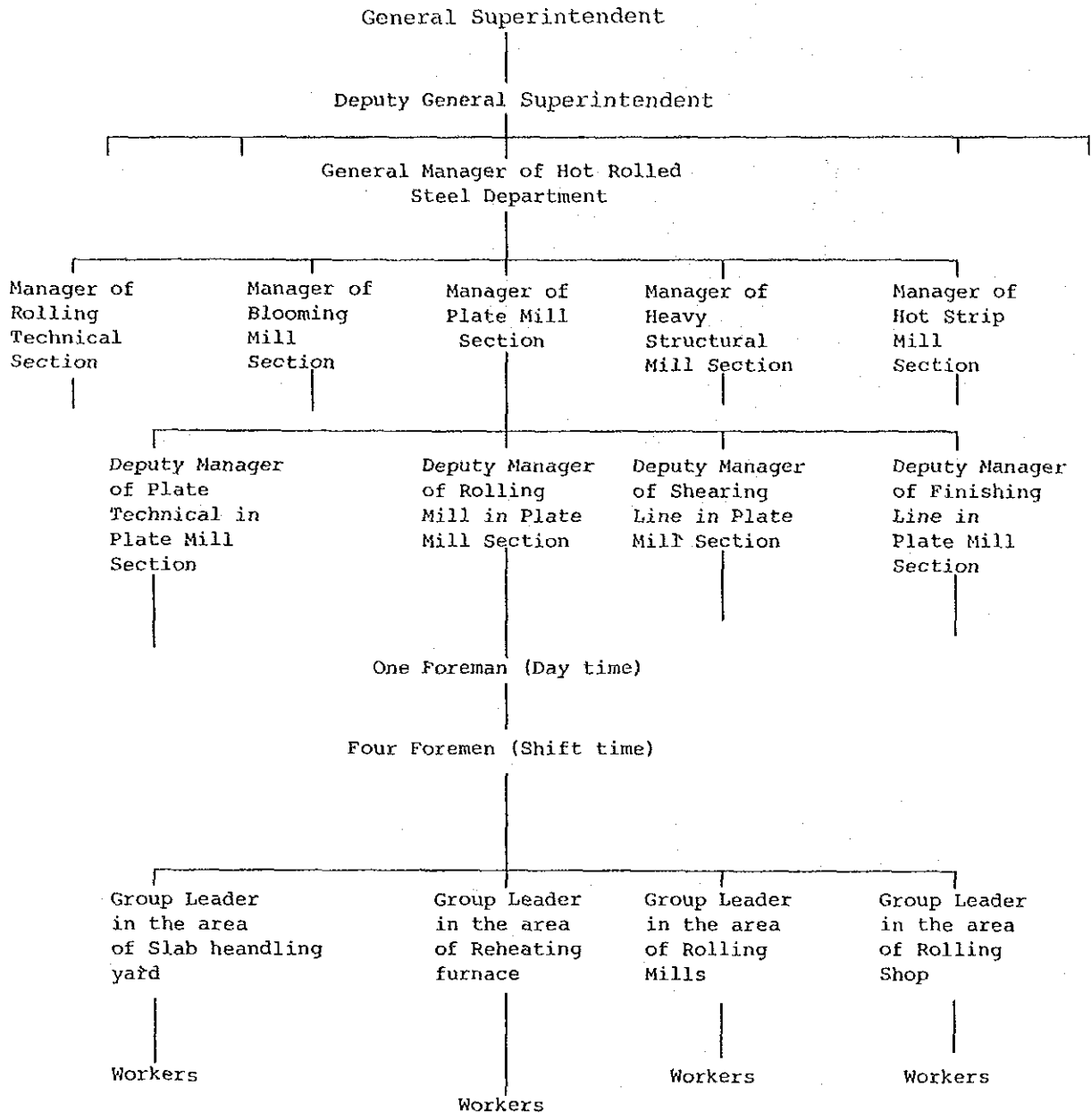
It is highly appreciated for you not to misunderstand the meaning of the object of mechanization and automation of the operation. The final target of this object should be the improvement of the operational circumstances which would be directly connected with the improvement of the productivity.

### 2.4 The multiplicity in an organization

The multiplicity in an organization is the real situations, not only at IISCO, but also at the other works and plants of iron and steel industries in India including SAIL's other plants. It might be the problem of the whole India or an unique problem in India.

The more multiplex in an organization from the top management to the labourer causes the more obstruction of the improvement of productivity induced by the increase of the number of persons in an organization, and furthermore generates the further delay in operation and the worse inconsistent and insufficient instruction and order.

In case of the iron and steel industries in Japan, the following chart has been applied.



## 2.5 The idea of the controlling:

(such as Production control, Quality control and Cost control, etc.)

The idea of the controlling came into existence in U.S.A. After introduction of this idea from U.S.A. and its improvement at Japan, Japan has established Japanese own idea of the controlling.

The followings are a part of introduction of the idea of the controlling in Japan:

### On Controlling in Japan

On Controlling not only on cost, but also on quality, production, maintenance and so on, we have the following common idea in Japan, that is, Controlling consists of four factors, Plan (P), Do (D), Check (C) and Act (A).

P means concrete planning or concrete target making and furthermore P is discussed studied and decided by the responsibility of, for instance, Plant Manager, and authorized by, for instance, Plant General Manager. That also means Plant Manager is to have contract with his General Manager to do.

D means carrying out according to the Plan, for this, for instance, Plant Manager orders concretely to his men to keep the plan, under limited conditions. As a matter of course, when the Plant Manager establishes the plan, he always discusses, studies and concludes with his men. His men mean his staff (engineers, officers and so on) and his workers (including assistant managers, foremen, group-leaders -if any-, and workers).

C means checking the results of D if they followed P concretely or not. And, this is very important for the Controlling, C is done sometimes by themselves who did - we call it voluntary Control Activities, in Japanese Jishu-Kanri, JK activities. As a matter

of course, sometimes done by the third party people, what is called, the staff people.

The difference of the results of C are analysed thoroughly whether the results of C are correct or not. If the results of C are correct, the higher target is surely established at the establishment of the next target. If the results of C are incorrect, the cause of incorrectness could be eliminated, and then incorrectness would not be happened repeatedly.

A means action, using the results of C, they must re-make the plan which they established before, concretely. This also means, the any kinds of standards which are "one-of-P" must be corrected everytime they need.

Due to this process, they can establish better P for the next stage.

This controlling method is called, in Japan, P-D-C-A Circle Control System, namely the endless activity such as  $P_1-D_1-C_1-A_1-P_2-D_2-C_2-A_2$  ..... is continueing and connected with the drive of the improvement of Productivity.

In the system, however, we must pay more attention when we decide P, that is, as human being, sometimes or always we hesitate to establish the higher target, for instance, to do higher rolling yield, to do better fuel consumption and etc.

Therefore, the plant manager, must have "challenge spirit" to establish higher target, and at the same time, the general manager must forgive the plant manager who could not achieve the target, even if he did his best.

Example of C and A to improve the rolling yield:

1. We check the past twelve months rolling yield.
2. We eliminate worst three automatically and the best one when it is too good.



3. We calculate the average value of the rest (average of eight months).
4. We adopt, as the new rolling yield, one of two, that is, one is the average value, another is the second best one.
5. For adopting the second best, we need the strong challenging spirit, and at the same time, the boss must understand the spirit and the possibility of the new target.
6. After all, the target curve can approach to the theoretical value as possible.



1. Details of Total Investment



## Details of Total Investment

(Unit: Rupees in Lakhs)

Item	Facilities			Grand total			1st Step			2nd Step			
	Portion	Domestic	Import	Total	Domestic	Import	Total	Domestic	Import	Total	Domestic	Import	Total
① Land reclamation		5,400	0	5,450	5,450	0	5,450	0	0	5,450	0	0	0
② Civil		10,300	0	10,300	5,531	0	5,531	4,769	0	4,769	0	0	4,769
③ Building		13,225	0	13,225	7,476	0	7,476	5,749	0	5,749	0	0	5,749
④ Machinery & equipment		48,674	58,374	107,048	22,685	32,273	54,958	25,989	26,101	52,090	1,463	0	8,305
⑤ Erection		12,959	3,936	16,895	6,117	2,473	8,590	6,842	0	6,842	0	0	6,842
⑥ Vehicle		5,469	21	5,490	381	13	394	5,068	0	5,068	0	0	5,068
⑦ Transport & insurance (Total ① - ⑦)		3,026 (99,103)	6,051 (68,382)	9,077 (167,485)	1,678 (49,318)	3,356 (38,115)	5,034 (87,433)	1,348 (49,785)	2,695 (30,267)	4,043 (80,052)	0	0	0
⑧ Duties & taxes		36,232 9,650	0	45,872	20,301 4,522	0	24,823	15,921 5,128	0	21,049	0	0	21,049
(Total ① - ⑧)		(144,975)	(68,382)	(213,357)	(74,141)	(38,115)	(112,256)	(70,834)	(30,267)	(101,101)	(30,267)	(30,267)	(101,101)
⑨ Engineering fee		2,219	5,177	7,396	1,154	2,692	3,846	1,065	2,485	3,550	0	0	3,550
⑩ Training		0	300	300	0	254	254	0	46	46	0	0	46
⑪ Technical assistance		0	471	471	0	391	391	0	80	80	0	0	80
⑫ Pre-operating expenses		370	0	370	192	0	192	178	0	178	0	0	178
⑬ Spares		1,338	2,087	3,425	733	1,261	1,994	605	826	1,431	0	0	1,431
⑭ Contingencies		4,955	3,418	8,373	2,466	1,905	4,371	2,489	1,513	4,002	0	0	4,002
(Total ① - ⑭)		(153,857)	(79,835)	(233,692)	(78,686)	(44,618)	(123,304)	(75,171)	(35,217)	(110,388)	(35,217)	(35,217)	(110,388)
⑮ Interest during construction													
Grand total													

## Details of Total Investment

(Unit: Rupees in Lakhs)

Facilities	(1) Raw materials yard <1S>			(2) Raw materials yard <2S>			(A) Raw materials yard, <C>			(3) Sinter plant <1S>		
	Item	Portion	Total	Domestic	Import	Total	Domestic	Import	Total	Domestic	Import	Total
① Land reclamation			0	0	0	0	0	0	0	0	0	0
② Civil			538	538	0	538	67	0	605	492	0	498
③ Building			538	538	148	538	148	0	686	1,686	0	1,686
④ Machinery & equipment			1,541	1,470	262	3,011	262	82	1,803	2,277	2,153	4,430
⑤ Erection			326	110	41	436	41	9	367	449	138	587
⑥ Vehicle			24	0	0	24	0	0	24	12	0	12
⑦ Transport & insurance (Total ① - ⑦)			79 (3,046)	159 (1,739)	4 (522)	238 (4,785)	4 (522)	9 (100)	83 (3,568)	115 (5,037)	230 (2,521)	345 (7,558)
⑧ Duties & taxes (Total ① - ⑧)			959 314	0	52 52	1,273 (6,058)	52 52	0	1,011 (4,945)	1,394 (6,896)	0	1,859 (9,417)
⑨ Engineering fee			0	0	0	0	0	0	0	0	0	0
⑩ Training			0	18	0	18	0	0	0	0	18	18
⑪ Technical assistance			0	66	0	66	0	0	66	0	93	93
⑫ Pre-operating expenses			0	0	0	0	0	0	0	0	0	0
⑬ Spares			89	115	11	204	11	4	100	159	151	310
⑭ Contingencies			152	87	26	239	26	5	178	252	126	378
(Total ① - ⑭)			(4,560)	(2,025)	(663)	(6,585)	(663)	(109)	(5,223)	(7,307)	(2,909)	(10,216)
⑮ Interest during construction												
Grand total												

## Details of Total Investment

(Unit: Rupees in Lakhs)

Item	(4) Sinter plant <2S>			(B) Sinter plant, total <C>			(5) Coke plant <1S>			(6) Coke plant <2S>			
	Portion	Domestic	Import	Total	Domestic	Import	Total	Domestic	Import	Total	Domestic	Import	Total
① Land reclamation		0	0	0	0	0	0	0	0	0	0	0	0
② Civil		485	0	485	983	0	983	110	0	110	1,673	0	1,673
③ Building		1,510	0	1,510	3,196	0	3,196	47	0	47	1,115	0	1,115
④ Machinery & equipment		2,072	2,180	4,252	4,349	4,333	8,682	943	38	981	11,435	2,857	14,292
⑤ Erection		425	138	563	874	276	1,150	141	0	141	3,099	0	3,099
⑥ Vehicle		0	0	0	12	0	12	0	0	0	234	0	234
⑦ Transport & insurance (Total ① - ⑦)		114 (4,606)	229 (2,547)	343 (7,153)	229 (9,643)	459 (5,068)	688 (14,711)	2 (1,243)	4 (42)	6 (1,285)	146 (17,702)	291 (3,148)	437 (20,850)
⑧ Duties & taxes		1,385 413	0	1,798	2,779 878	0	3,657	24 183	0	207	1,763 2,255	0	4,018
(Total ① - ⑧)		(6,404)	(2,547)	(8,951)	(13,300)	(5,068)	(18,368)	(1,450)	(42)	(1,492)	(21,720)	(3,148)	(24,868)
⑨ Engineering fee		0	0	0	0	0	0	0	0	0	0	0	0
⑩ Training		0	0	0	0	18	18	0	0	0	0	0	0
⑪ Technical assistance		0	26	26	0	119	119	0	0	0	0	0	0
⑫ Pre-operating expenses		0	0	0	0	0	0	0	0	0	0	0	0
⑬ Spares		104	109	213	263	260	523	19	1	20	197	57	254
⑭ Contingencies		230	127	357	482	253	735	62	2	64	885	157	1,042
(Total ① - ⑭)		(6,738)	(2,809)	(9,547)	(14,045)	(5,718)	(19,763)	(1,531)	(45)	(1,576)	(22,802)	(3,362)	(26,164)
⑮ Interest during construction													
Grand total													

## Details of Total Investment

(Unit: Rupees in Lakhs)

Item	(C) Coke plant, total <⊙>			(7) No.5 Blast furnace <1S>			(8) No.6 Blast furnace <2S>			(D) Blast furnace, total <⊙>		
	Domestic	Import	Total	Domestic	Import	Total	Domestic	Import	Total	Domestic	Import	Total
① Land reclamation	0	0	0	0	0	0	0	0	0	0	0	0
② Civil	1,783	0	1,783	1,083	0	1,083	1,025	0	1,025	2,108	0	2,108
③ Building	1,162	0	1,162	857	0	857	686	0	686	1,543	0	1,543
④ Machinery & equipment	12,378	2,895	15,273	5,001	6,725	11,726	4,841	6,547	11,388	9,842	13,272	23,114
⑤ Erection	3,240	0	3,240	734	271	1,005	724	230	954	1,458	501	1,959
⑥ Vehicle	234	0	234	0	13	13	0	8	8	0	21	21
⑦ Transport & insurance (Total ① - ⑥)	148 (18,945)	295 (3,190)	443 (22,135)	353 (8,028)	706 (7,715)	1,059 (15,743)	342 (7,618)	684 (7,469)	1,026 (15,087)	695 (15,546)	1,390 (15,184)	2,085 (30,830)
⑧ Duties & taxes (Total ① - ⑧)	1,787 (23,170)	0 (3,190)	4,225 (26,360)	4,269 (13,259)	0 (7,715)	5,231 (20,974)	3,762 (12,309)	0 (7,469)	4,691 (19,778)	8,031 (25,568)	0 (15,184)	9,922 (40,752)
⑨ Engineering fee	0	0	0	0	0	0	0	0	0	0	0	0
⑩ Training	0	0	0	0	38	38	0	38	38	0	76	76
⑪ Technical assistance	0	0	0	0	54	54	0	54	54	0	108	108
⑫ Pre-operating expenses	0	0	0	0	0	0	0	0	0	0	0	0
⑬ Spares	216	58	274	61	317	378	46	285	331	107	602	709
⑭ Contingencies	947	159	1,106	401	386	787	381	373	754	782	759	1,541
(Total ① - ⑭)	(24,323)	(3,407)	(27,740)	(13,721)	(8,510)	(22,231)	(12,736)	(8,219)	(20,955)	(26,457)	(16,729)	(43,186)
⑮ Interest during construction												
Grand total												



# Details of Total Investment

(Unit: Rupees in Lakhs)

Item	(9) No.1 Lime calcaining plant			(10) No.2 Lime calcaining plant			(E) Lime calcaining plant, <@>			(11) No.1 & 2 BOF plant <1S>		
	Domestic	Import	Total	Domestic	Import	Total	Domestic	Import	Total	Domestic	Import	Total
① Land reclamation	0	0	0	0	0	0	0	0	0	0	0	0
② Civil	281	0	281	61	0	61	342	0	342	560	0	560
③ Building	103	0	103	3	0	3	106	0	106	1,871	0	1,871
④ Machinery & equipment	770	290	1,060	405	152	557	1,175	442	1,617	4,729	2,306	7,035
⑤ Erection	121	121	242	73	90	163	194	211	405	399	258	657
⑥ Vehicle	0	0	0	0	0	0	0	0	0	199	0	199
⑦ Transport & insurance (Total ① - ⑦)	16 (1,291)	32 (443)	48 (1,734)	8 (550)	17 (259)	25 (809)	24 (1,841)	49 (702)	73 (2,543)	125 (7,883)	249 (2,813)	374 (10,696)
⑧ Duties & taxes	194 152	0	346	101 80	0	181	295 232	0	527	1,507 964	0	2,471
(Total ① - ⑧)	(1,637)	(443)	(2,080)	(731)	(259)	(990)	(2,368)	(702)	(3,070)	(10,354)	(2,813)	(13,167)
⑨ Engineering fee	0	0	0	0	0	0	0	0	0	0	0	0
⑩ Training	0	8	8	0	0	0	0	8	8	0	57	57
⑪ Technical assistance	0	0	0	0	0	0	0	0	0	0	116	116
⑫ Pre-operating expenses	0	0	0	0	0	0	0	0	0	0	0	0
⑬ Spares	31	31	62	15	15	30	46	46	92	147	185	332
⑭ Contingencies	65	22	87	28	13	41	93	35	128	394	141	535
(Total ① - ⑭)	(1,733)	(504)	(2,237)	(774)	(287)	(1,061)	(2,507)	(791)	(3,296)	(10,895)	(3,312)	(14,207)
⑮ Interest during construction												
Grand total												

## Details of Total Investment

(Unit: Rupees in Lakhs)

Facilities		(12) No.3 BOF plant <2S>			(F) BOF plant, total <@>			(13) Ingot casting <1S>			(14) Bloom-1 CC plant <1S>		
Item	Portion	Domestic	Import	Total	Domestic	Import	Total	Domestic	Import	Total	Domestic	Import	Total
① Land reclamation		0	0	0	0	0	0	0	0	0	0	0	0
② Civil		144	0	144	704	0	704	49	0	49	138	0	138
③ Building		356	0	356	2,227	0	2,227	258	0	258	401	0	401
④ Machinery & equipment		1,523	908	2,431	6,252	3,214	9,466	737	0	737	805	756	1,561
⑤ Erection		137	125	262	536	383	919	125	0	125	222	0	222
⑥ Vehicle		92	0	92	291	0	291	146	0	146	0	0	0
⑦ Transport & insurance (Total ① - ⑦)		48 (2,300)	95 (1,128)	143 (3,428)	173 (10,193)	344 (3,941)	517 (14,124)	0 (1,315)	0 (0)	0 (1,315)	38 (1,604)	76 (832)	114 (2,436)
⑧ Duties & taxes		576 315	0	891	2,083 1,279	0	3,362	0	0	0	458 158	0	616
(Total ① - ⑧)		(3,191)	(1,128)	(4,319)	(13,545)	(3,941)	(17,486)	(1,484)	(0)	(1,484)	(2,220)	(832)	(3,052)
⑨ Engineering fee		0	0	0	0	0	0	0	0	0	0	0	0
⑩ Training		0	0	0	0	57	57	0	0	0	0	15	15
⑪ Technical assistance		0	0	0	0	116	116	0	0	0	0	12	12
⑫ Pre-operating expenses		0	0	0	0	0	0	0	0	0	0	0	0
⑬ Spares		44	44	88	191	229	420	7	0	7	26	0	26
⑭ Contingencies		115	56	171	509	197	706	66	0	66	80	42	122
(Total ① - ⑭)		(3,350)	(1,228)	(4,578)	(14,245)	(4,540)	(18,785)	(1,557)	(0)	(1,557)	(2,326)	(901)	(3,227)
⑮ Interest during construction													
Grand total													

### Details of Total Investment

(Unit: Rupees in Lakhs)

Item	(15) Billet-1 CC plant <1S>			(16) Billet-2 CC plant <2S>			(17) Billet-3 CC plant <2S>			(G) Ingot casting-CC, total <C>		
	Domestic	Import	Total	Domestic	Import	Total	Domestic	Import	Total	Domestic	Import	Total
① Land reclamation	0	0	0	0	0	0	0	0	0	0	0	0
② Civil	138	0	138	137	0	137	137	0	137	599	0	599
③ Building	401	0	401	347	0	347	347	0	347	1,754	0	1,754
④ Machinery & equipment	879	674	1,553	693	613	1,306	693	613	1,306	3,607	2,656	6,463
⑤ Erection	226	0	226	187	0	187	187	0	187	947	0	947
⑥ Vehicle	0	0	0	30	0	30	30	0	30	206	0	206
⑦ Transport & insurance (Total ① - ⑦)	34 (1,678)	67 (741)	101 (2,419)	31 (1,425)	61 (674)	92 (2,099)	31 (1,425)	51 (674)	92 (2,099)	134 (7,447)	265 (2,921)	399 (10,368)
⑧ Duties & taxes	408 172	0	580	371 142	0	513	371 142	0	513	1,608 783	0	2,391
(Total ① - ⑧)	(2,258)	(741)	(2,999)	(1,938)	(674)	(2,612)	(1,938)	(674)	(2,612)	(9,838)	(2,921)	(12,759)
⑨ Engineering fee	0	0	0	0	0	0	0	0	0	0	0	0
⑩ Training	0	15	15	0	0	0	0	0	0	0	30	30
⑪ Technical assistance	0	12	12	0	0	0	0	0	0	0	24	24
⑫ Pre-operating expenses	0	0	0	0	0	0	0	0	0	0	0	0
⑬ Spares	27	0	27	22	0	22	22	0	22	104	0	104
⑭ Contingencies	84	37	121	71	34	105	71	34	105	372	147	519
(Total ① - ⑭)	(2,369)	(805)	(3,174)	(2,031)	(708)	(2,739)	(2,031)	(708)	(2,739)	(10,314)	(3,122)	(13,436)
⑮ Interest during construction												
Grand total												

(Unit: Rupees in Lakhs)

## Details of Total Investment

Item	(18) No.1 New bar & Sect. mill <1S>			(19) No.2 New bar & Sect. mill <2S>			(20) Blooming mill <1S>			(21) Heavy structural mill <1S>			
	Portion	Domestic	Import	Total	Domestic	Import	Total	Domestic	Import	Total	Domestic	Import	Total
① Land reclamation		0	0	0	0	0	0	0	0	0	0	0	0
② CIVIL		779	0	779	793	0	793	31	0	31	34	0	34
③ Building		734	0	734	812	0	812	23	0	23	23	0	23
④ Machinery & equipment		2,979	5,051	8,030	3,603	6,091	9,694	754	1,802	2,556	200	481	681
⑤ Erection		821	124	945	1,003	151	1,154	365	55	420	112	17	129
⑥ Vehicle		0	0	0	0	0	0	0	0	0	0	0	0
⑦ Transport & insurance (Total ① - ⑦)		263 (5,576)	525 (5,700)	788 (11,276)	317 (6,528)	634 (6,876)	951 (13,404)	94 (1,267)	187 (2,044)	281 (3,311)	25 (394)	50 (548)	75 (942)
⑧ Duties & taxes (Total ① - ⑧)		3,178 589	0	3,767	3,833 712	0	4,545	1,134 149	0	1,283	303 40	0	343
⑨ Engineering fee		0	0	0	0	0	0	0	0	0	0	0	0
⑩ Training		0	75	75	0	0	0	0	0	0	0	0	0
⑪ Technical assistance		0	38	38	0	0	0	0	0	0	0	0	0
⑫ Pre-operating expenses		0	0	0	0	0	0	0	0	0	0	0	0
⑬ Spares		119	202	321	144	244	388	30	72	102	8	19	27
⑭ Contingencies		279	285	564	326	344	670	63	102	165	20	27	47
(Total ① - ⑭)		(9,741)	(6,300)	(16,041)	(11,543)	(7,464)	(19,007)	(2,643)	(2,218)	(4,861)	(765)	(594)	(1,359)
⑮ Interest during construction													
Grand total													

## Details of Total Investment

(Unit: Rupees in Lakhs)

Item	(22) Billet mill <1s>			(23) Merchant mill <1s>			(24) Sheet mill <1s>			(H) Rolling dept., Total (18-24)			
	Portion	Domestic	Import	Total	Domestic	Import	Total	Domestic	Import	Total	Domestic	Import	Total
① Land reclamation		0	0	0	0	0	0	0	0	0	0	0	0
② Civil		36	0	36	36	0	36	0	0	0	1,709	0	1,709
③ Building		27	0	27	42	0	42	0	0	0	1,661	0	1,661
④ Machinery & equipment		94	201	295	143	430	573	0	239	239	7,773	14,295	22,068
⑤ Erection		23	4	27	43	7	50	16	2	18	2,383	360	2,743
⑥ Vehicle		0	0	0	0	0	0	0	0	0	0	0	0
⑦ Transport & insurance (Total ① - ⑦)		10 (190)	21 (226)	31 (416)	22 (286)	45 (482)	67 (768)	12 (28)	25 (266)	37 (294)	743 (14,269)	1,487 (16,142)	2,230 (30,411)
⑧ Duties & taxes		127 19	0	146	271 28	0	299	151 0	0	151	8,997 1,537	0	10,534
(Total ① - ⑧)		(396)	(226)	(562)	(585)	(482)	(1,067)	(179)	(266)	(445)	(24,803)	(16,142)	(40,945)
⑨ Engineering fee		0	0	0	0	0	0	0	0	0	0	0	0
⑩ Training		0	0	0	0	0	0	0	0	0	0	75	75
⑪ Technical assistance		0	0	0	0	0	0	0	0	0	0	38	38
⑫ Pre-operating expenses		0	0	0	0	0	0	0	0	0	0	0	0
⑬ Spares		4	8	12	6	17	23	0	10	10	311	572	883
⑭ Contingencies		10	11	21	14	24	38	1	13	14	713	806	1,519
(Total ① - ⑭)		(350)	(245)	(595)	(605)	(523)	(1,128)	(180)	(289)	(469)	(25,827)	(17,633)	(43,460)
⑮ Interest during construction													
Grand total													

## Details of Total Investment

(Unit: Rupees in Lakhs)

Item	(25) Power receiving & distributing facil. <1S>			(26) Power receiving & distributing facil. <2S>			(27) No.1 Power plant <1S>			(28) No.2 Power plant <2S>		
	Domestic	Import	Total	Domestic	Import	Total	Domestic	Import	Total	Domestic	Import	Total
① Land reclamation	0	0	0	0	0	0	0	0	0	0	0	0
② Civil	15	0	15	0	0	0	231	0	231	99	0	99
③ Building	41	0	41	0	0	0	99	0	99	43	0	43
④ Machinery & equipment	0	579	579	0	128	128	0	3,402	3,402	0	3,402	3,402
⑤ Erection	443	23	466	224	19	243	528	340	868	528	340	868
⑥ Vehicle	0	0	0	0	0	0	0	0	0	0	0	0
⑦ Transport & insurance (Total ① - ⑦)	30 (529)	60 (662)	90 (1,191)	6 (230)	13 (160)	19 (390)	174 (1,032)	347 (4,089)	521 (5,121)	174 (844)	347 (4,089)	521 (4,933)
⑧ Duties & taxes	361	0	361	78	0	78	2,099	0	2,099	2,099	0	2,099
(Total ① - ⑧)	(890)	(662)	(1,552)	(308)	(160)	(468)	(3,131)	(4,089)	(7,220)	(2,943)	(4,029)	(7,032)
⑨ Engineering fee	0	0	0	0	0	0	0	0	0	0	0	0
⑩ Training	0	0	0	0	0	0	0	0	0	0	0	0
⑪ Technical assistance	0	0	0	0	0	0	0	0	0	0	0	0
⑫ Pre-operating expenses	0	0	0	0	0	0	0	0	0	0	0	0
⑬ Spares	0	17	17	0	0	0	0	68	68	0	68	68
⑭ Contingencies	26	33	59	12	6	20	52	204	256	42	204	246
(Total ① - ⑭)	(916)	(712)	(1,628)	(320)	(168)	(488)	(3,183)	(4,361)	(7,544)	(2,985)	(4,361)	(7,346)
⑮ Interest during construction												
Grand total												

## Details of Total Investment

(Unit: Rupees in Lakhs)

Facilities Item	Power, & facil. total < ① >			(29) No.1 Oxygen plant < 1S >			(30) No.2 Oxygen plant < 2S >			(Ib) Oxygen plant, total < ② >			
	Portion	Domestic	Import	Total	Domestic	Import	Total	Domestic	Import	Total	Domestic	Import	Total
① Land reclamation		0	0	0	0	0	0	0	0	0	0	0	0
② Civil		345	0	345	107	0	107	53	0	53	160	0	160
③ Building		183	0	183	133	0	133	66	0	66	199	0	199
④ Machinery & equipment		0	7,511	7,511	218	2,952	3,170	109	1,476	1,585	327	4,428	4,755
⑤ Erection		1,723	722	2,445	96	338	434	48	169	217	144	507	651
⑥ Vehicle		0	0	0	0	0	0	0	0	0	0	0	0
⑦ Transport & insurance (Total ① - ⑦)		384 (2,635)	767 (9,000)	1,151 (11,635)	148 (702)	295 (3,585)	443 (4,287)	74 (350)	148 (1,793)	222 (2,143)	222 (1,052)	442 (5,378)	665 (6,430)
⑧ Duties & taxes		4,637	0	4,637	1,786	0	1,827	893	0	914	2,679	0	2,741
(Total ① - ⑧)		(7,272)	(9,000)	(16,272)	(2,529)	(3,585)	(6,114)	(1,264)	(1,793)	(3,057)	(3,793)	(5,378)	(9,171)
⑨ Engineering fee		0	0	0	0	0	0	0	0	0	0	0	0
⑩ Training		0	0	0	0	0	0	0	0	0	0	0	0
⑪ Technical assistance		0	0	0	0	0	0	0	0	0	0	0	0
⑫ Pre-operating expenses		0	0	0	0	0	0	0	0	0	0	0	0
⑬ Spares		0	153	153	0	0	0	0	0	0	0	0	0
⑭ Contingencies		132	449	581	35	179	214	18	90	108	53	269	322
(Total ① - ⑭)		(7,404)	(9,602)	(17,006)	(2,564)	(3,764)	(6,328)	(1,282)	(1,893)	(3,165)	(3,846)	(5,647)	(9,493)
⑮ Interest during construction													
Grand total													

## Details of Total Investment

(Unit: Rupees in Lakhs)

Item	(31) No.1 BF blower <1S>		(32) No.2 BF blower <2S>		(1c) BF blower, total <C>		(33) Water treatment (Id) <1S>		
	Portion	Total	Domestic	Import	Domestic	Import	Domestic	Import	Total
① Land reclamation		0	0	0	0	0	0	0	0
② Civil	32	32	16	0	16	48	110	0	110
③ Building	105	105	53	0	53	158	33	0	33
④ Machinery & equipment	115	1,667	57	776	833	172	76	115	191
⑤ Erection	43	409	25	183	208	68	118	109	227
⑥ Vehicle	0	0	0	0	0	0	0	0	0
⑦ Transport & insurance (Total ① - ⑦)	78 (373)	235 (2,448)	39 (190)	78 (1,037)	117 (1,227)	117 (563)	6 (343)	12 (236)	18 (579)
⑧ Duties & taxes	949 22	971	470 11	0	481	1,419 33	70 14	0	84
(Total ① - ⑧)	(1,344)	(3,419)	(671)	(1,037)	(1,708)	(2,015)	(427)	(236)	(663)
⑨ Engineering fee	0	0	0	0	0	0	0	0	0
⑩ Training	0	0	0	0	0	0	0	0	0
⑪ Technical assistance	0	0	0	0	0	0	0	0	0
⑫ Pre-operating expenses	0	0	0	0	0	0	0	0	0
⑬ Spares	0	16	0	0	0	0	0	16	0
⑭ Contingencies	19	123	10	52	62	29	17	12	29
(Total ① - ⑭)	(1,363)	(3,558)	(681)	(1,089)	(1,770)	(2,044)	(444)	(248)	(692)
⑮ Interest during construction									
Grand total									



## Details of Total Investment

(Unit: Rupees in Lakhs)

Item	Facilities			(34) Gas facilities <1S>			(35) Gas facilities <2S>			(1e) Gas facilities, total <3>			(1) Utility, total <4>			
	Portion	Domestic	Import	Total	Domestic	Import	Total	Domestic	Import	Total	Domestic	Import	Total	Domestic	Import	Total
① Land reclamation		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
② Civil		255	0	255	3	0	3	258	0	258	921	0	921			
③ Building		54	0	54	0	0	0	54	0	54	627	0	627			
④ Machinery & equipment		424	1,057	1,481	0	60	60	424	1,117	1,541	999	15,499	16,498			
⑤ Erection		766	190	956	60	8	68	826	198	1,024	2,879	2,085	4,964			
⑥ Vehicle		0	0	0	0	0	0	0	0	0	0	0	0			
⑦ Transport & insurance (Total ① - ⑦)		54 (1,553)	109 (1,356)	163 (2,909)	3 (66)	6 (74)	9 (140)	57 (1,619)	115 (1,430)	172 (3,049)	785 (6,212)	1,572 (19,156)	2,358 (25,368)			
⑧ Duties & taxes		659 81	0	740	36 0	0	36	695 81	0	776	9,500 190	0	9,690			
(Total ① - ⑧)		(2,293)	(1,356)	(3,649)	(102)	(74)	(176)	(2,395)	(1,430)	(3,825)	(15,902)	(19,156)	(35,058)			
⑨ Engineering fee		0	0	0	0	0	0	0	0	0	0	0	0			
⑩ Training		0	0	0	0	0	0	0	0	0	0	0	0			
⑪ Technical assistance		0	0	0	0	0	0	0	0	0	0	0	0			
⑫ Pre-operating expenses		0	0	0	0	0	0	0	0	0	0	0	0			
⑬ Spares		0	32	32	0	0	0	0	52	32	0	201	201			
⑭ Contingencies		78	68	146	3	4	7	81	72	153	312	958	1,270			
(Total ① - ⑭)		(2,371)	(1,456)	(3,827)	(105)	(78)	(183)	(2,476)	(1,534)	(4,010)	(16,214)	(20,315)	(36,529)			
⑮ Interest during construction																
Grand total																

## Details of Total Investment

(Unit: Rupees in Lakhs)

Item	(36) Machine assembly shop <2S>		(37) Electric repair shop <2S>		(38) Forging shop <2S>		(39) Structure shop <2S>	
	Portion	Total	Domestic	Import	Domestic	Import	Domestic	Import
① Land reclamation	0	0	0	0	0	0	0	0
② Civil	29	29	18	0	26	0	3	0
③ Building	53	53	126	0	44	0	40	0
④ Machinery & equipment	176	187	58	0	30	205	32	0
⑤ Erection	23	24	17	0	36	0	5	0
⑥ Vehicle	0	0	0	0	0	0	0	0
⑦ Transport & insurance (Total ① - ⑦)	1 (382)	2 (295)	0 (219)	0 (0)	10 (146)	21 (236)	0 (80)	0 (0)
⑧ Duties & taxes	7 33	40	0 11	0	124 6	0	0 6	0
(Total ① - ⑧)	(322)	(335)	(230)	(0)	(276)	(226)	(86)	(0)
⑨ Engineering fee	0	0	0	0	0	0	0	0
⑩ Training	0	8	0	0	0	0	0	0
⑪ Technical assistance	0	0	0	0	0	0	0	0
⑫ Pre-operating expenses	0	0	0	0	0	0	0	0
⑬ Spares	0	0	0	0	0	0	0	0
⑭ Contingencies	14	15	11	0	7	11	4	0
(Total ① - ⑭)	(336)	(358)	(241)	(0)	(283)	(237)	(90)	(0)
⑮ Interest during construction								
Grand total								

## Details of Total Investment

(Unit: Rupees in Lakhs)

Item	(J) Maintenance Facilit., < ② >		(40) Admin. & common < 1 S >		(41) Admin. & common < 2 S >		(42) Transport dept. < 1 S >	
	Portion	Total	Domestic	Import	Domestic	Import	Domestic	Import
① Land reclamation	0	0	5,450	0	5,450	0	0	0
② Civil	76	76	296	0	296	0	174	0
③ Building	263	263	0	0	0	0	0	0
④ Machinery & equipment	296	512	0	0	0	0	0	0
⑤ Erection	81	82	0	0	0	0	0	0
⑥ Vehicle	0	0	0	0	0	0	0	0
⑦ Transport & insurance (Total ① - ⑦)	11 (727)	33 (966)	0 (5,746)	0 (0)	0 (5,746)	0 (0)	0 (174)	0 (0)
⑧ Duties & taxes	131 56	187	0	0	0	0	0	0
(Total ① - ⑧)	(914)	(1,153)	(5,746)	(0)	(5,746)	(0)	(174)	(0)
⑨ Engineering fee	0	0	1,154	2,692	3,846	1,065	2,485	3,550
⑩ Training	0	8	0	10	10	0	0	0
⑪ Technical assistance	0	0	0	0	0	0	0	0
⑫ Pre-operating expenses	0	0	192	0	192	178	0	178
⑬ Spares	0	0	0	0	0	0	0	0
⑭ Contingencies	36	48	287	0	287	0	9	0
(Total ① - ⑭)	(950)	(1,209)	(7,379)	(2,702)	(10,081)	(1,243)	(183)	(0)
⑮ Interest during construction								
Grand total								

# Details of Total Investment

(Unit: Rupees in Lakhs)

Item	Facilities	(43) Transport dept. <2S>			(K) Admin. & transport, <C>		
		Domestic	Import	Total	Domestic	Import	Total
① Land reclamation		0	0	0	5,450	0	5,450
② Civil		0	0	0	470	0	470
③ Building		0	0	0	0	0	0
④ Machinery & equipment		0	0	0	0	0	0
⑤ Erection		0	0	0	0	0	0
⑥ Vehicle		4,702	0	4,702	4,702	0	4,702
⑦ Transport & insurance (Total ① - ⑦)		0 (4,702)	0 (0)	0 (4,702)	0 (10,622)	0 (0)	0 (10,622)
⑧ Duties & taxes		0	0	0	0	0	0
(Total ① - ⑧)		(4,702)	(0)	(4,702)	(10,622)	(0)	(10,622)
⑨ Engineering fee		0	0	0	2,219	5,177	7,396
⑩ Training		0	0	0	0	10	10
⑪ Technical assistance		0	0	0	0	0	0
⑫ Pre-operating expenses		0	0	0	370	0	370
⑬ Spares		0	0	0	0	0	0
⑭ Contingencies		235	0	235	531	0	531
(Total ① - ⑭)		(4,937)	(0)	(4,937)	(13,742)	(5,187)	(18,929)
⑮ Interest during construction							
Grand total							

2. Details of Variable Cost  
(Step 1, 1.0 MT)



## Variable Cost

Cost Center: Material Yard 1.0 - MT Production 2,364.3 x 1,000 ton

Item	Quantity	Unit Price (Rs.)	Amount (1,000 Rs.)	Unit Consumpt.	Unit Cost Rs./ton
Ore fine (Sinter)	1,052.4x10 <sup>3</sup> t	112	117,869		
Manganese ore fine (Sinter)	45.7x10 <sup>3</sup> t	183	8,363		
High grade ore (BF)	175.3x10 <sup>3</sup> t	142	24,809		
Low grade ore (BF)	403.2x10 <sup>3</sup> t	135	54,432		
Ore (BOF)	32.0x10 <sup>3</sup> t	145	4,640		
Lime stone (Sinter)	165.3x10 <sup>3</sup> t	190	31,407		
Lime stone (BF)	42.0x10 <sup>3</sup> t	190	7,980		
Lime stone (BOF)	233.0x10 <sup>3</sup> t	250	58,250		
Dolomite stone (Sinter)	164.0x10 <sup>3</sup> t	195	31,980		
Dolomite stone (BOF)	23.3x10 <sup>3</sup> t	200	4,760		
Quartzite (Sinter)	29.5x10 <sup>3</sup> t	155	4,588		
(Material cost total)	( 2,364.3x10 <sup>3</sup> t )		( 348,878 )		
Electricity	11,822x10 <sup>3</sup> kWh		4,114	5.0 kWh/t	1.74
(Utilities total)			( 4,114 )		( 1.74 )
Variable cost total	2,364.3x10 <sup>3</sup> t		352,992		

## Variable Cost

Cost Center: Sintering 1.0 - MT Production 1,344.0 x 1,000 ton

Item	Quantity	Unit Price (Rs.)	Amount (1,000 Rs.)	Unit Consumpt.	Unit Cost Rs./ton
* Ore fine	1,052.4x10 <sup>3</sup> t	113.32	119,259	783 kg/t	
* Mang. ore fine	45.7x10 <sup>3</sup> t	185.16	8,462	34 kg/t	
* Lime stone	165.3x10 <sup>3</sup> t	192.24	31,777	123 kg/t	
* Dolomite stone	164.0x10 <sup>3</sup> t	197.30	32,357	122 kg/t	
* Quartzite	29.5x10 <sup>3</sup> t	156.62	4,642	22 kg/t	
Flue dust	26.3x10 <sup>3</sup> t	67	1,762	20 kg/t	
Quick lime fine	13.3x10 <sup>3</sup> t	—	—	10 kg/t	
(Material cost total)	( 1,497.3x10 <sup>3</sup> t )		( 198,259 )		( 147.51 )
Coke breeze	121.0x10 <sup>3</sup> t	422	51,062	90 kg/t	37.99
Gas	67,200x10 <sup>6</sup> kcal		7,594	50x10 <sup>3</sup> kcal/t	
Electricity	53,760x10 <sup>3</sup> kWh		18,709	40.0 kWh/t	
Industrial water	671x10 <sup>6</sup> Q		503	0.5x10 <sup>3</sup> Q/t	
(Utilities total)			( 26,806 )		( 18.95 )
Variable cost total	1,344.0x10 <sup>3</sup> t		276,127		205.45

## Variable Cost

Cost Center: Coke Oven

1.0 - MT Production BF Coke 792.2 x 1,000 ton

Item	Quantity	Unit Price (Rs.)	Amount (1,000 Rs.)	Unit Consumpt.	Unit Cost Rs./ton
Coal (prime)	665.5x10 <sup>3</sup> t	675	449,213		
Coal (medium)	399.3x10 <sup>3</sup> t	513	244,771		
Coal (blendable)	133.1x10 <sup>3</sup> t	473	62,956		
Coal (Australia)	133.1x10 <sup>3</sup> t	1,020	135,762		
(Coal total)	( 1,331.0x10 <sup>3</sup> t )	( 670.7 )	( 892,702 )		( 1,126.87 )
By-product (gas)	(-) 1,483,776x10 <sup>6</sup> kcal		(-) 165,407		
By-product (coak breeze)	(-) 198.1x10 <sup>3</sup> t	422	(-) 83,588		
By-product (ether)			(-) 45,715		
(By-product total)			(-) 295,720		( (-) 373.29 )
(Material cost total)			556,982		( 753.58 )
Gas	859,826x10 <sup>6</sup> kcal		97,160	646x10 <sup>3</sup> kcal/t	
Electricity	35,837x10 <sup>3</sup> kWh		12,506	27.0 kWh/t	
Steam	612,260 t		57,160	0.461 t/t	
Industrial water	1,331x10 <sup>6</sup> l		998	1.0x10 <sup>3</sup> l/t	
Nitrogen	333x10 <sup>3</sup> Nm <sup>3</sup>		85	0.25 Nm <sup>3</sup> /t	
(Utilities total)			( 167,909 )		( 211.85 )
Absorbent oil	389 t	3,027	1,208		1.52
Variable cost total	BF coke 792.2x10 <sup>3</sup> t		766,089		967.05
By-product (screening) (coak breeze)	(-) 75.2x10 <sup>3</sup> t	422	(-) 31,422		
Variable cost total	Lump coke 713.0x10 <sup>3</sup> t		732,677		1,027.65
For BF	572.0x10 <sup>3</sup> t		690,546		1,027.60
For sales	41.0x10 <sup>3</sup> t		42,131		1,027.60

## Variable Cost

Cost Center: Blast Furnace (1)

1.0 - MT Production 1,050.0 x 1,000 ton

Item	Quantity	Unit Price (Rs.)	Amount (1,000 Rs.)	Unit Consumpt.	Unit Cost Rs./ton
* Coke	672.0x10 <sup>3</sup> t	1,027.60	690,546		
* Sinter	1,344.0x10 <sup>3</sup> t	205.45	276,127		
* H. grade ore	173.3x10 <sup>3</sup> t		24,899		
* L. grade ore	403.2x10 <sup>3</sup> t		55,074		
Scrap (iron)	14.7x10 <sup>3</sup> t	1,830	26,901		
* Lime stone	42.0x10 <sup>3</sup> t		8,074		
Other sub-material (Main & sub material)			( 1,089,281 )		( 1,046.91 )
By-product (slag)	(-) 493.5x10 <sup>3</sup> t	237	(-) 116,960		
By-product (dust)	(-) 26.3x10 <sup>3</sup> t	67	(-) 1,762		
By-product (skull)	(-) 7.8x10 <sup>3</sup> t	1,220	(-) 9,516		
By-product (gas)	(-) 1,757,220x10 <sup>6</sup> kcal		(-) 198,586		
(By-product total)			( (-) 326,804 )		( (-) 311.24 )
(Material cost total)			( 772,457 )		( 735.67 )
Electricity (blower)	115,500x10 <sup>3</sup> kWh		40,195	110.0 kWh/t	
Indust. water (blower)	18x10 <sup>6</sup> l		12	0.015x10 <sup>3</sup> l/t	
Electricity	40,950x10 <sup>3</sup> kWh		14,252	380.0 kWh/t	
Gas	646,800x10 <sup>6</sup> kcal		73,088	615x10 <sup>3</sup> kcal/t	
Steam	48,300 t		4,509	0.046 t/t	
Nitrogen	5,250x10 <sup>3</sup> Nm <sup>3</sup>		1,342	5.0 Nm <sup>3</sup> /t	
Industrial water	3,150x10 <sup>6</sup> l		2,360	3.0x10 <sup>3</sup> l/t	
(Utilities total)			( 135,758 )		( 129.30 )
Hot metal Variable cost total	1,050.0x10 <sup>3</sup> t		908,215		864.97



Variable Cost

Cost Center: Blast Furnace (2) 1.0 — MT Production 1,029.0 x 1,000 ton

Item	Quantity	Unit Price (Rs.)	Amount (1,000 Rs.)	Unit Consumpt.	Unit Cost Rs./ton
* Hot metal	1,050.0x10 <sup>3</sup> t	864.97	908,216		882.62
By-product (iron scrap)	(-)	1,830	32,757		
By-product (skull)	(-)	1,220	3,782		
(By-product total)	(-)		36,539		(-)
Variable cost total	1,029.0x10 <sup>3</sup> t		871,676		847.11
For BOF	966.4x10 <sup>3</sup> t		818,647		847.11
For cold pig	62.6x10 <sup>3</sup> t		53,029		847.11

Variable Cost

Cost Center: Cold Pig Iron 1.0 — MT Production 62.6 x 1,000 ton

Item	Quantity	Unit Price (Rs.)	Amount (1,000 Rs.)	Unit Consumpt.	Unit Cost Rs./ton
* Hot metal	62.6x10 <sup>3</sup> t	847.11	53,029		847.11
Electricity	313x10 <sup>3</sup> kWh		109	5.0 kWh/t	
Industrial water	12x10 <sup>6</sup> l		9	0.2x10 <sup>3</sup> l/t	
(Utilities total)			118		1.88
Variable cost total	62.6x10 <sup>3</sup> t		53,147		848.99
For BOF	23.3x10 <sup>3</sup> t		19,782		848.99
For sales	39.3x10 <sup>3</sup> t		33,365		848.99

## Variable Cost

Cost Center: Burnt Lime

1.0 - MT Production 120.0 x 1,000 ton

Item	Quantity	Unit Price (Rs.)	Amount (1,000 Rs.)	Unit Consumpt.	Unit Cost Rs./ton
* Lime stone	233.0x10 <sup>3</sup> t		58,037		491.14
Nitrogen	3x10 <sup>3</sup> Nm <sup>3</sup>		1	0.02 Nm <sup>3</sup> /t	
Industrial water	108x10 <sup>6</sup> ℓ		79	0.8x10 <sup>3</sup> ℓ/t	
Gas	136,26x10 <sup>6</sup> kcal		15,284	1,017x10 <sup>3</sup> kcal/t	
Electricity	8,845x10 <sup>3</sup> kWh		3,009	65.0 kWh/t	
(Utilities total)			( 18,373 )		( 153.11 )
Refractory (brick)	40 t	4,000	160	0.33 kg/t	1.33
Variable cost total			77,470		645.58

## Variable Cost

Cost Center: Dolomite

1.0 - MT Production 10.0 x 1,000 ton

Item	Quantity	Unit Price (Rs.)	Amount (1,000 Rs.)	Unit Consumpt.	Unit Cost Rs./ton
* Dolomite stone	23.8x10 <sup>3</sup> t		4,916		481.60
Electricity	285x10 <sup>3</sup> kWh		99	28.48 kWh/t	
Industrial water	3x10 <sup>6</sup> ℓ		2		
Steam	2,200 t		205	0.22 t/t	
Gas	25,000x10 <sup>6</sup> kcal		2,825	2,500x10 <sup>6</sup> kcal/t	
(Utilities total)			( 3,131 )		( 313.10 )
Refractory			570		57.00
Variable cost total	10.0x10 <sup>3</sup> t		8,517		851.70

## Variable Cost

Cost Center: Basic Oxygen Furnaces (LD) 1.0 — MT Production molten steel 1,036.3x1,000 ton

Item	Quantity	Unit Price (Rs.)	Amount (1,000 Rs.)	Unit Consumpt.	Unit Cost Rs./ton
• Hot metal	966.4x10 <sup>3</sup> t	847.11	818,647	932.6 kg/t	
• Cold pig iron	23.2x10 <sup>3</sup> t	848.99	19,782	22.5 kg/t	
Scrap (return)	168.4x10 <sup>3</sup> t	1,877	316,094	188.5 kg/t	
Scrap (purchase)	5.3x10 <sup>3</sup> t	2,030	12,789		
(Main material cost)	( 1,164.4x10 <sup>3</sup> t )		( 1,167,312 )	( 1,123.7 kg/t )	( 1,126.42 )
• Burnt lime	120.0x10 <sup>3</sup> t	645.58	77,470	115.8 kg/t	
• Ore	32.0x10 <sup>3</sup> t	146.72	4,695	30.9 kg/t	
• Burnt dolomite	10.0x10 <sup>3</sup> t	851.70	8,517	9.7 kg/t	
Fluorspar	4.0x10 <sup>3</sup> t	4,007	16,028	3.9 kg/t	
Ferro-manganese	8.8x10 <sup>3</sup> t	7,800	68,640	8.5 kg/t	
Ferro-silicon	1.5x10 <sup>3</sup> t	13,800	20,700	1.4 kg/t	
Aluminium	0.2x10 <sup>3</sup> t	23,300	4,660	0.2 kg/t	
Coke (breaze)	0.7x10 <sup>3</sup> t	2,584	1,879	0.7 kg/t	
(Sub-material)	( 177.2x10 <sup>3</sup> t )		( 202,589 )		( 195.49 )
By-product (steel scrap)	(—)	2,030	(—)		
By-product (skull)	(—)	1,226	(—)		
By-product (gas)	(—)		(—)		
(By-product total)			( 52,800 )		( 51.05 )
(Material cost total)			( 1,317,001 )		( 1,276.86 )
Oxygen	66,396x10 <sup>3</sup> Nm <sup>3</sup>		17,483	66.0 Nm <sup>3</sup> /t	
Nitrogen	9,327x10 <sup>3</sup> Nm <sup>3</sup>		2,364	9.0 Nm <sup>3</sup> /t	
Gas	20,726x10 <sup>6</sup> kcal		2,342	20x10 <sup>3</sup> kcal/t	
Electricity	31,089x10 <sup>3</sup> kWh		10,819	30.0 kWh/t	
Industrial water	311x10 <sup>6</sup> l		233	0.3x10 <sup>3</sup> l/t	
(Utilities total)			( 33,251 )		( 32.10 )
Main brick	520 t	4,000	2,080	0.50 kg/t	
Furnace brick	12,300 t	7,450	91,635	11.9 kg/t	
Ladle brick	450 t	1,200	540	0.43 kg/t	
(Refractory total)			( 94,255 )		( 90.95 )
Molten Steel Variable cost total	1,036.3x10 <sup>3</sup> t		1,444,517		1,393.92
For ingot casting	531.0x10 <sup>3</sup> t		740,170		1,393.92
For S.L-1 CC	297.0x10 <sup>3</sup> t		413,994		1,393.92
For B.T-1 CC	208.3x10 <sup>3</sup> t		290,353		1,393.92

## Variable Cost

Cost Center: Ingot Casting 1.0 — MT Production 515.0 x 1,000 ton

Item	Quantity	Unit Price (Rs.)	Amount (1,000 Rs.)	Unit Consumpt.	Unit Cost Rs./ton
• Molten steel	531.0x10 <sup>3</sup> t	1,393.92	740,170		1,437.22
By-product (skull)	(—)	1,220	(—)		
By-product (steel)	(—)	2,030	(—)		
(By-product total)	( 16.0x10 <sup>3</sup> t )		( 28,167 )		( 54.73 )
(Material cost total)			( 711,983 )		( 1,382.49 )
Ladle brick	2,369 t	2,077	4,920	4.6 kg/t	9.55
Sliding nozzle	309 t	59,200	18,293	0.5 kg/t	35.52
(Refractory total)			( 23,213 )		( 45.07 )
Al-shot	51.5 t	23,300	1,200	0.1 kg/t	2.33
Ingot mould	11,330 t	6,206	70,314	22.0 kg/t	136.53
Bottom plate	1,803 t	6,408	11,554	3.5 kg/t	22.43
Electricity	1,030x10 <sup>3</sup> kWh		358	2.0 kWh/t	
Gas	4,120x10 <sup>6</sup> kcal		466	8x10 <sup>3</sup> kcal/t	
Oxygen	52x10 <sup>3</sup> Nm <sup>3</sup>		13	0.1 Nm <sup>3</sup> /t	
(Utilities total)			( 837 )		( 1.64 )
Variable cost total	515.0x10 <sup>3</sup> t		819,101		1,590.49
For blooming mill	515.0x10 <sup>3</sup> t		819,101		1,590.49

## Variable Cost

Cost Center: BL-1 CC

1.0 — MT Production 285.0 x 1,000 ton

Item	Quantity	Unit Price (Rs.)	Amount (1,000 Rs.)	Unit Consumpt.	Unit Cost Rs./ton
* Molten steel	297.0x10 <sup>3</sup> t	1,353.92	419,994		1,452.61
By-product (steel)	(-)	2,030	(-)		
By-product (skull)	(-)	1,220	(-)		
By-product (scale)	(-)	30	(-)		
(By-product total)	(-)		(-)		(-)
(Material cost total)			( 398,079 )		( 1,396.77 )
Ladle brick	1,653 t	2,077	3,433	5.8 kg/t	
Sliding nozzle	85.5 t	59,200	5,062	0.3 kg/t	
Fire clay brick	1,140 t	2,077	2,368	4.0 kg/t	
Castable (Hi-Al)	712.5 t	3,800	2,708	2.5 kg/t	
Nozzle (zircon)	34.2 t	61,500	2,103	0.12 kg/t	
(Refractory total)			( 15,674 )		( 55.0 )
LPG	142.5x10 <sup>3</sup> Nm <sup>3</sup>	5,434/10 <sup>3</sup>	774	0.5 m <sup>3</sup> /t	
Reprocessed oil	34,200 ℓ	11.3	386	120 cc/t	
Copper mould	5,700 kg	430	2,451	20 g/t	
Al wire					
Burnt paddy	85,500 kg	4.9	419	0.3 kg/t	
Tips	9,120 p	17.4	159	0.032 p/t	
(Sub-material total)			( 4,188 )		( 14.71 )
Electricity	2,850x10 <sup>3</sup> kWh		992	10.0 kWh/t	
Industrial water	114x10 <sup>6</sup> ℓ		85	0.4x10 <sup>3</sup> ℓ/t	
Gas	5,130x10 <sup>6</sup> kcal		580	18x10 <sup>3</sup> kcal/t	
Oxygen	456x10 <sup>3</sup> Nm <sup>3</sup>		117	1.6 Nm <sup>3</sup> /t	
Nitrogen	114x10 <sup>3</sup> Nm <sup>3</sup>		29	0.4 Nm <sup>3</sup> /t	
(Utilities total)			( 1,803 )		( 6.31 )
Variable cost total	285.0x10 <sup>3</sup> t		419,745		1,472.79
For blooming mill	285.0x10 <sup>3</sup> t		419,745		1,472.79

## Variable Cost

Cost Center: BT-1 CC

1.0 — MT Production 200.0 x 1,000 ton

Item	Quantity	Unit Price (Rs.)	Amount (1,000 Rs.)	Unit Consumpt.	Unit Cost Rs./ton
* Molten steel	208.3x10 <sup>3</sup> t	1,393.92	290,353		1,451.77
By-product (steel)	(-)	2,030	(-)		
By-product (skull)	(-)	1,220	(-)		
By-product (scale)	(-)	30	(-)		
(By-product total)	(-)		(-)		(-)
(Material cost total)			( 279,415 )		( 1,397.08 )
Ladle brick	1,160 t	2,077	2,409	5.8 kg/t	
Sliding nozzle	120 t	59,200	7,104	0.6 kg/t	
Fire clay brick	1,200 t	2,077	2,492	6.0 kg/t	
Castable (Hi-Al)	900 t	3,800	3,420	4.5 kg/t	
Nozzle (zircon)	18 t	61,500	1,107	0.09 kg/t	
(Refractory total)			( 15,532 )		( 82.66 )
LPG					
Reprocessed oil	24,000 ℓ	11.3	271	120 cc/t	
Copper mould	4,600 kg	430	1,720	20 g/t	
Al wire	20.0 t	23,300	466	100 g/t	
Burnt paddy	60,000 kg	4.9	294	0.3 kg/t	
Tips	6,400 p	17.4	111	0.032 p/t	
(Sub-material total)			( 2,862 )		( 14.31 )
Electricity	2,000x10 <sup>3</sup> kWh		696	10.0 kWh/t	
Industrial water	80x10 <sup>6</sup> ℓ		60	0.4x10 <sup>3</sup> ℓ/t	
Gas	3,600x10 <sup>6</sup> kcal		407	18x10 <sup>3</sup> kcal/t	
Oxygen	20x10 <sup>3</sup> Nm <sup>3</sup>		5	0.1 Nm <sup>3</sup> /t	
Nitrogen	80x10 <sup>3</sup> Nm <sup>3</sup>		20	0.4 Nm <sup>3</sup> /t	
(Utilities total)			( 1,188 )		( 5.94 )
Variable cost total	200.0x10 <sup>3</sup> t		299,997		1,499.99
For No. 1 New Bar	200.0x10 <sup>3</sup> t		299,997		1,499.99

Variable Cost  
Cost Center: Blooming mill 1.0 — MT Production 756.0 x 1,000 ton

Item	Quantity	Unit Price (Rs.)	Amount (1,000 Rs.)	Unit Consumpt.	Unit Cost Rs./ton
* Ingot steel	515.0x10 <sup>3</sup> t	1,580.48	819,101		( 1,728.06)
By-product (scale)	(-) 15.4x10 <sup>3</sup> t	30	482		
By-product (scrap)	(-) 25.6x10 <sup>3</sup> t	2,030	51,968		
(By-product total)	(-) 41.0x10 <sup>3</sup> t		( 52,430)		((-) 110.61)
(Material cost)	( 474.0x10 <sup>3</sup> t)		( 766,671)		(( 1,617.45)
* Cost bloom	285.0x10 <sup>3</sup> t	1,472.74	419,745		( 1,483.45)
By-product (scale)	(-) 1.2x10 <sup>3</sup> t	30	36		
By-product (scrap)	(-) 1.8x10 <sup>3</sup> t	2,030	3,654		
(By-product total)	(-) 3.0x10 <sup>3</sup> t		( 3,690)		((-) 13.08)
(Material cost)	( 282.0x10 <sup>3</sup> t)		( 416,055)		(( 1,475.37)
Roll	52,820 kg	20	1,058	0.07 kg/t	1.40
Consumables			4,113		5.44
Gas	334,908x10 <sup>6</sup> kcal		37,845	443x10 <sup>3</sup> kcal	
Electricity	18,734x10 <sup>3</sup> kWh		6,520	24.78 kWh/t	
Industrial water	302x10 <sup>6</sup> ℓ		226		
(Utilities total)			( 44,581)		( 58.98)
Variable cost total	756.0x10 <sup>3</sup> t		1,232,488		1,630.29
For Billet mill	480.0x10 <sup>3</sup> t		807,120		1,681.50
For HSM	276.0x10 <sup>3</sup> t		425,368		1,541.19

Variable Cost  
Cost Center: Billet mill 1.0 — MT Production 453.6 x 1,000 ton

Item	Quantity	Unit Price (Rs.)	Amount (1,000 Rs.)	Unit Consumpt.	Unit Cost Rs./ton
* Bloom	480.0x10 <sup>3</sup> t	1,681.50	807,120		1,779.36
By-product (scale)	(-) 4.8x10 <sup>3</sup> t	30	144		
By-product (scrap)	(-) 21.8x10 <sup>3</sup> t	2,030	43,848		
(By-product total)	(-) 26.4x10 <sup>3</sup> t		( 43,992)		( (-) 96.98)
(Material cost)	( 763,128)		( 763,128)		( 1,682.38)
Roll	88,040 kg	25	1,701	0.15 kg/t	3.75
Consumables			4,282		9.44
Electricity	12,020x10 <sup>3</sup> kWh		4,182	26.5 kWh/t	
Industrial water	327x10 <sup>6</sup> ℓ		245		
(Utilities total)			( 4,428)		( 9.76)
Variable cost total	453.6x10 <sup>3</sup> t		773,538		1,705.33
For sheet bar	127.0x10 <sup>3</sup> t		216,577		1,705.33
For merchant	261.0x10 <sup>3</sup> t		445,092		1,705.33
For No. 1 New Bar	80.0x10 <sup>3</sup> t		102,320		1,705.33
For sales	5.6x10 <sup>3</sup> t		9,550		1,705.33

Variable Cost

Cost Centre: Sheet mill 10 - MT Production 100.0 x 1,000 ton

Item	Quantity	Unit Price (Rs.)	Amount (1,000 Rs.)	Unit Consumpt.	Unit Cost Rs./ton
* Sheet bar	127.0x10 <sup>3</sup> t	1,706.33	216,577		2,165.77
By-product (scale)	(-) 0.5x10 <sup>3</sup> t	30	(-) 15		
By-product (scrap)	(-) 26.5x10 <sup>3</sup> t	2,030	(-) 53,795		
(By-product total)	(-) 27.0x10 <sup>3</sup> t		(-) 53,810		(-) 538.10
(Material cost)			( 162,767 )		( 1,627.67 )
Roll	265,000 kg	20	5,300	2.65 kg/t	53.00
Consumables	—	—	420	—	4.2
Gas	140,000x10 <sup>6</sup> kcal		15,820	1,400x10 <sup>3</sup> kcal/t	
Electricity	20,110x10 <sup>3</sup> kWh		6,998	201.1 kWh/t	
Industrial water	—	—	—	—	—
Steam	30,000 t		2,801	0.3 t/t	
(Utilities total)			( 25,619 )		( 256.19 )
Variable cost total	100.0x10 <sup>3</sup> t		194,106		1,941.06
For galvanized sheet	30.0x10 <sup>3</sup> t		58,232		1,941.06
For sales (black sheet)	70.0x10 <sup>3</sup> t		135,874		1,941.06

Variable Cost

Cost Centre: Galvanized Sheet 1.0 - MT Production 30.0 x 1,000 ton

Item	Quantity	Unit Price (Rs.)	Amount (1,000 Rs.)	Unit Consumpt.	Unit Cost Rs./ton
* Black sheet	30.0x10 <sup>3</sup> t	1,941.06	58,232		1,941.06
Spelter	2,452.5 t	29,500	72,349	81.75 kg/t	2,411.63
By-product (zinc dross)	(-) 270 t	19,000	(-) 5,130		
By-product (skimming)	(-) 188 t	2,600	(-) 488		
(By-product total)	(-) ( )		(-) 5,618		(-) 187.29
Consumables	—	—	720	—	24.00
Industrial water	160x10 <sup>6</sup> l		120		4.00
(Utilities total)			( 120 )		( 4.00 )
Variable cost total	30.0x10 <sup>3</sup> t		125,802		4,133.40
For sales	30.0x10 <sup>3</sup> t		125,802		4,133.40

## Variable Cost

Cost Center: Merchant &amp; Bar 1.0 — MT Production 250.0 x 1,000 ton

Item	Quantity	Unit Price (Rs.)	Amount (1,000 Rs.)	Unit Consumpt.	Unit Cost Rs./ton
* Billet	261.0x10 <sup>3</sup> t	1,705.33	445,092		1,780.37
By-product (scale)	(-)	30	156		
By-product (scrap)	(-)	2,030	11,774		
(By-product total)	(-)		11,930		(-) 47.72
(Material cost)			( 433,162 )		( 1,732.65 )
Roll	55,000 kg	28	1,540	0.22 kg/t	6.16
Consumables	---	---	5,325	---	21.30
Gas	100,000x10 <sup>6</sup> kcal		11,300	40x10 <sup>3</sup> kcal/t	
Electricity	15,025x10 <sup>3</sup> kWh		5,229	60.1 kWh/t	
Industrial water	35x10 <sup>6</sup> ℓ		26		
Steam	40,000 t		3,734	0.16 t/t	
(Utilities total)			( 20,289 )		( 81.15 )
Variable cost total	250.0x10 <sup>3</sup> t		460,316		1,841.26
For sales	250.0x10 <sup>3</sup> t		460,316		1,841.26

## Variable Cost

Cost Center: No.1 New Bar 1.0 — MT Production 254.0 x 1,000 ton

Item	Quantity	Unit Price (Rs.)	Amount (1,000 Rs.)	Unit Consumpt.	Unit Cost Rs./ton
* Cost billet (BT CC-1)	200.0x10 <sup>3</sup> t	1,499.99	299,997		
* Billet	60.0x10 <sup>3</sup> t	1,705.33	102,320		
(Total)	( 260.0x10 <sup>3</sup> t )	( 1,549.32 )	( 402,317 )		( 1,583.92 )
By-product (scale)	(-)	30	78		
By-product (scrap)	(-)	2,030	6,902		
(By-product total)	(-)		( 6,980 )		(-) 27.48
(Material cost)			( 395,337 )		( 1,556.44 )
Roll	76,200 kg	28	2,134	0.3 kg/t	8.40
Consumables	---	---	5,410	---	21.30
Gas	66,560x10 <sup>6</sup> kcal		7,750	270x10 <sup>3</sup> kcal/t	
Electricity	22,860x10 <sup>3</sup> kWh		7,955	90.0 kWh/t	
Industrial water	127x10 <sup>6</sup> ℓ		95	0.5x10 <sup>3</sup> ℓ/t	
(Utilities total)			( 15,800 )		( 62.21 )
Variable cost total	254.0x10 <sup>3</sup> t		418,661		1,646.35
For sales	254.0x10 <sup>3</sup> t		418,661		1,646.35

Variable Cost

Cost Center: Heavy Structural 1.0 - MT Production 250.0 x 1,000 ton

Item	Quantity	Unit Price (Rs.)	Amount (1,000 Rs.)	Unit Consumpt.	Unit Cost Rs./ton
* Blotom	276.0x10 <sup>3</sup> t	1,541.19	425,368		1,701.47
By-product (scale)	(-) 5.4x10 <sup>3</sup> t	30	(-) 162		
By-product (scrap)	(-) 20.6x10 <sup>3</sup> t	2,030	(-) 41,818		
(By-product total)	(-) 26.0x10 <sup>3</sup> t		(-) 41,980		(-) 167.92
(Material cost)			( 383,388 )		( 1,533.55 )
Roll	375,000 kg	20	7,500	1.5 kg/t	30.00
Consumables			6,763		27.05
Gas	100,000x10 <sup>6</sup> kcal		11,300	400x10 <sup>3</sup> kcal/t	
Electricity	29,650x10 <sup>3</sup> kWh		10,318	118.6 kWh/t	
Industrial water	220x10 <sup>6</sup> l		615		
Steam	32,580 t		3,034	0.13 t/t	
(Utilities total)			( 24,917 )		( 99.27 )
Variable cost total	250.0x10 <sup>3</sup> t		422,468		1,669.87
For sales	250.0x10 <sup>3</sup> t		422,468		1,669.87

Variable Cost

Cost Center: Power Plant (own) 1.0 - MT Generation 386,543 x 10<sup>3</sup> kWh

Item	Quantity	Unit Price (Rs.)	Amount (1,000 Rs.)	Unit Consumpt.	Unit Cost Rs./ton
Gas	773,085x10 <sup>6</sup> kcal	113	87,359		
Industrial water	2,319x10 <sup>6</sup> l	0.749	1,758		
Electricity	3,865x10 <sup>3</sup> kWh	0.348	1,347		
Variable cost total	386,543x10 <sup>3</sup> kWh		90,444		0.234

Variable Cost

Cost Center: Power Distribution 1.0 - MT

Purchase 153,405 x 10<sup>3</sup> kWh  
Own Gene. 386,543 x 10<sup>3</sup> kWh  
Distribution 514,236 x 10<sup>3</sup> kWh

Item	Quantity	Unit Price (Rs.)	Amount (1,000 Rs.)	Unit Consumpt.	Unit Cost Rs./ton
Purchased	153,405x10 <sup>3</sup> kWh	0.577	88,515		
Own	386,543x10 <sup>3</sup> kWh	0.234	90,444		
(Total)	( 539,948x10 <sup>3</sup> kWh )	( 0.331 )	( 178,959 )		
Variable cost total	514,236x10 <sup>3</sup> kWh		178,959		0.348



Variable Cost  
Cost Center: Industrial Water

1.0 — MT Distribution 10,084 x 10<sup>6</sup> ℓ

Item	Quantity	Unit Price (Rs.)	Amount (1,000 Rs.)	Unit Consumpt.	Unit Cost Rs./ton
Electricity	4,487x10 <sup>3</sup> kWh	0.348	1,555		
Consumables			6,000		
Variable cost total	10,084x10 <sup>6</sup> ℓ		7,555		0.749

Variable Cost  
Cost Center: Steam

1.0 — MT

Generation 883,875 t  
Distribution 845,612 t

Item	Quantity	Unit Price (Rs.)	Amount (1,000 Rs.)	Unit Consumpt.	Unit Cost Rs./ton
Coal	193,249 t	356	68,832		
Electricity	6,806x10 <sup>3</sup> kWh	0.348	2,368		
Filtered water	796x10 <sup>6</sup> ℓ	0.306	243		
Steam	80,352 t	93.35	7,499		
Variable cost total	845,612 t		78,942		93.35

Variable Cost

Cost Center: Filtered Water

1.0 — MT Distribution 9,466 x 10<sup>6</sup> ℓ

Item	Quantity	Unit Price (Rs.)	Amount (1,000 Rs.)	Unit Consumpt.	Unit Cost Rs./ton
Electricity	8,321x10 <sup>3</sup> kWh	0.348	9,466		
Variable cost total	8,321x10 <sup>3</sup> kWh		9,466		0.306

Variable Cost

Cost Center: Oxygen & Nitrogen

1.0 — MT

Generation 84,836 x 10<sup>3</sup> Nm<sup>3</sup>  
Distribution 84,031 x 10<sup>3</sup> Nm<sup>3</sup>

Item	Quantity	Unit Price (Rs.)	Amount (1,000 Rs.)	Unit Consumpt.	Unit Cost Rs./ton
Electricity	60,000x10 <sup>3</sup> kWh	0.348	20,880		
Industrial water	600x10 <sup>6</sup> ℓ	0.749	599		
Variable cost total	84,031x10 <sup>3</sup> Nm <sup>3</sup>		21,479		0.256



3. Details of Variable Cost  
(Step 2, 2.15 MT)



## Variable Cost

Cost Center: Material Yard 2.15 -MT Production 4,965.2x1,000 ton

Item	Quantity	Unit Price (Rs.)	Amount (1,000 Rs.)	Unit Consumpt.	Unit Cost Rs./ton
Ore fine (Sinter)	2,204.9x10 <sup>3</sup> t	112	246,949		
Manganese ore fine (Sinter)	95.7x10 <sup>3</sup> t	183	17,513		
High grade ore (BF)	363.0x10 <sup>3</sup> t	142	51,546		
Low grade ore (BF)	844.8x10 <sup>3</sup> t	135	114,048		
Ore (BOF)	67.4x10 <sup>3</sup> t	145	9,648		
Lime stone (Sinter)	346.4x10 <sup>3</sup> t	190	65,816		
Lime stone (BF)	88.0x10 <sup>3</sup> t	190	16,720		
Lime stone (BOF)	502.0x10 <sup>3</sup> t	250	125,500		
Dolomite stone (Sinter)	343.6x10 <sup>3</sup> t	195	67,002		
Dolomite stone (BOF)	92.4x10 <sup>3</sup> t	200	10,480		
Quartzite (Sinter)	62.0x10 <sup>3</sup> t	155	9,610		
(Material cost total)	( 4,965.2x10 <sup>3</sup> t )		( 734,232 )		
Electricity	24,826x10 <sup>3</sup> kWh		6,068	5 kWh/t	
(Utilities total)			( 6,068 )		
Variable cost total	4,965.2x10 <sup>3</sup> t		740,300		

## Variable Cost

Cost Center: Sintering 2.15 -MT Production 2,816.0 x 1,000 ton

Item	Quantity	Unit Price (Rs.)	Amount (1,000 Rs.)	Unit Consumpt.	Unit Cost Rs./ton
* Ore fine	2,204.9x10 <sup>3</sup> t	112.93	248,989	783 kg/t	
* Mang. ore fine	95.7x10 <sup>3</sup> t	184.51	17,653	34 kg/t	
* Lime stone	346.4x10 <sup>3</sup> t	191.57	66,360	123 kg/t	
* Dolomite stone	343.6x10 <sup>3</sup> t	196.61	67,556	122 kg/t	
* Quartzite	62.0x10 <sup>3</sup> t	156.27	9,689	22 kg/t	
Flue dust	55.0x10 <sup>3</sup> t	67	3,685	20 kg/t	
Quick lime fine	28.7x10 <sup>3</sup> t	---	---	10 kg/t	
(Material cost total)	( 3,137.1x10 <sup>3</sup> t )		( 413,937 )		( 147.86 )
Coke breeze	253.4x10 <sup>3</sup> t	422	106,935	90 kg/t	37.97
Gas	140,800x10 <sup>6</sup> kcal		15,910	50x10 <sup>3</sup> kcal/t	
Electricity	112,640x10 <sup>3</sup> kWh		27,533	40 kWh/t	
Industrial water	1,408x10 <sup>6</sup> l		946	0.5x10 <sup>3</sup> l/t	
(Utilities total)			( 44,389 )		( 15.76 )
Variable cost total	2,816.0x10 <sup>3</sup> t		565,281		200.73

Variable Cost

Cost Center: Coke Oven

BF Coke

2.15 -MT Production 7,439.9 x 1,000 ton

Item	Quantity	Unit Price (Rs.)	Amount (1,000 Rs.)	Unit Consumpt.	Unit Cost Rs./ton
Coal (prime)	1,197.0x10 <sup>3</sup> t	675	807,975		
Coal (medium)	715.2x10 <sup>3</sup> t	613	440,257		
Coal (blendable)	239.4x10 <sup>3</sup> t	473	113,236		
Coal (Australia)	239.4x10 <sup>3</sup> t	1,020	244,188		
(Coal total)	( 2,394.0x10 <sup>3</sup> t )	( 670.7 )	( 1,505,656 )		( 1,115.67 )
By-product (gas)	(-12,362,523x10 <sup>6</sup> kcal)	113	(-1,394,766)		
By-product (coak breeze)	(-)	422	(-)		
By-product (others)			(-)		
(By-product total)			(-)		(-)
(Material cost total)			( 1,083,481 )		( 753.04 )
Gas	1,568,070x10 <sup>6</sup> kcal		177,192	655x10 <sup>3</sup> kcal/t	
Electricity	68,708x10 <sup>3</sup> kWh		18,794	28.7 kWh/t	
Steam	536,256 t		49,262	0.224 t/t	
Industrial water	4,309x10 <sup>6</sup> ℓ		2,896	1.8x10 <sup>3</sup> ℓ/t	
Nitrogen	599x10 <sup>3</sup> Nm <sup>3</sup>		108	0.25 Nm <sup>3</sup> /t	
(Utilities total)			( 246,252 )		( 171.16 )
Absorbent oil	718 t	3,027	2,173		1,51
Variable cost total	BF coke 1,438.8x10 <sup>3</sup> t		1,331,806		925.71
(screening)					
By-product (coak breeze)	(-)	422	(-)		
Variable cost total	1,296.0x10 <sup>3</sup> t		1,271,644		981.21
For BF	1,296.0x10 <sup>3</sup> t		1,271,644		981.21
For sale					

Variable Cost

Cost Center: Blast Furnace (1)

2.15 -MT Production 2,200.0 x 1,000 ton

Item	Quantity	Unit Price (Rs.)	Amount (1,000 Rs.)	Unit Consumpt.	Unit Cost Rs./ton
* Coke	1,296.0x10 <sup>3</sup> t	981.21	1,271,644	589 kg/t	
* Sinter	2,815.0x10 <sup>3</sup> t	200.73	565,261	1,280 kg/t	
* H. grade ore	353.0x10 <sup>3</sup> t	143.17	51,972	165 kg/t	
* L. grade ore	644.8x10 <sup>3</sup> t	136.12	114,991	384 kg/t	
Scrap (iron)	30.8x10 <sup>3</sup> t	1,830	56,364	14 kg/t	
* Lime stone	88.0x10 <sup>3</sup> t	191.57	16,858	40 kg/t	
Other sub-material			36,960		
(Main & sub material)			( 2,114,050 )		( 960.93 )
By-product (slag)	(-)	237	(-)		
By-product (dust)	(-)	67	(-)		
By-product (skull)	(-)	1,220	(-)		
By-product (gas)	(-)	113	(-)		
(By-product total)			(-)		(-)
(Material cost total)			( 1,464,154 )		( 665.52 )
Electricity (blower)	242,000x10 <sup>3</sup> kWh		55,152	110.0 kWh/t	
Indust. water (blower)	33x10 <sup>6</sup> ℓ		22	0.15x10 <sup>3</sup> ℓ/t	
Electricity	81,400x10 <sup>3</sup> kWh		19,897	37.0 kWh/t	
Gas	1,639,000x10 <sup>6</sup> kcal		185,207	745x10 <sup>3</sup> kcal/t	
Steam	101,200 t		9,298	0.046 t/t	
Nitrogen	11,000x10 <sup>3</sup> Nm <sup>3</sup>		1,981	5.0 Nm <sup>3</sup> /t	
Industrial water	6,150x10 <sup>6</sup> ℓ		4,140	2.8x10 <sup>3</sup> ℓ/t	
(Utilities total)			( 279,597 )		( 127.14 )
Hot metal	2,200.0x10 <sup>3</sup> t		1,743,851		792.66
Variable cost total					

Variable Cost

Cost Center: Blast Furnace (2) 2.15 -MT Production 2,156.0 x 1,000 ton

Item	Quantity	Unit Price (Rs.)	Amount (1,000 Rs.)	Unit Consumpt.	Unit Cost Rs./ton
* Hot metal	2,200x10 <sup>3</sup> t	792.66	1,743,851		808.34
By-product (iron scrap)	(-) 37.4x10 <sup>3</sup> t	1,830	(-) 68,442		
By-product (skull)	(-) 6.8x10 <sup>3</sup> t	1,220	(-) 8,052		
(By-product total)	(-) 44.0x10 <sup>3</sup> t		(-) 76,494		(-) 35.48
Variable cost total	2,156.0x10 <sup>3</sup> t		1,667,357		773.36
For BOF (LD)	2,090.0x10 <sup>3</sup> t		1,608,582		773.36
For cold pig	76.0x10 <sup>3</sup> t		58,775		773.36

Variable Cost

Cost Center: Cold Pig Iron 2.15 -MT Production 76.0 x 1,000 ton

Item	Quantity	Unit Price (Rs.)	Amount (1,000 Rs.)	Unit Consumpt.	Unit Cost Rs./ton
* Hot metal	76.0x10 <sup>3</sup> t	773.36	58,775		773.36
Electricity	388x10 <sup>3</sup> kWh		95	5.0 kWh/t	
Industrial water	15x10 <sup>6</sup> l		10	0.2x10 <sup>3</sup> l/t	
(Utilities total)			( 105 )		( 1.38 )
Variable cost total	76.0x10 <sup>3</sup> t		58,880		774.74
For BOF (LD)	50.0x10 <sup>3</sup> t		38,737		774.74
For sales	26.0x10 <sup>3</sup> t		20,143		774.74

Variable Cost

Cost Center: Burnt Lime

2.15 —MT Production 258.0 x 1,000 ton

Item	Quantity	Unit Price (Rs.)	Amount (1,000 Rs.)	Unit Consumpt.	Unit Cost Rs./ton
* Lime stone	502.0x10 <sup>3</sup> t		126,537		490.45
Nitrogen	6x10 <sup>3</sup> Nm <sup>3</sup>		1	0.02 Nm <sup>3</sup> /t	
Industrial water	230x10 <sup>6</sup> l		155	0.8x10 <sup>3</sup> l/t	
Gas	291,879x10 <sup>6</sup> kcal		32,982	1,017x10 <sup>3</sup> kcal/t	
Electricity	18,655x10 <sup>3</sup> kWh		4,560	65.0 kWh/t	
(Utilities total)			( 37,698 )		( 146.12 )
Refractory (brick)	86 t	4,000	344	0.33 kg/t	1.33
Variable cost total	258.0x10 <sup>3</sup> t		164,579		637.90

Variable Cost

Cost Center: Dolomite

2.15 —MT Production 22.0 x 1,000 ton

Item	Quantity	Unit Price (Rs.)	Amount (1,000 Rs.)	Unit Consumpt.	Unit Cost Rs./ton
* Dolomite stone	52.4x10 <sup>3</sup> t		10,567		480.32
Electricity	627x10 <sup>3</sup> kWh		153	28.48 kWh/t	
Industrial water	5x10 <sup>6</sup> l		3		
Steam	4,840 t		445	0.22 t/t	
Gas	55,000x10 <sup>6</sup> kcal		5,215	2,500x10 <sup>3</sup> kcal	
(Utilities total)			( 6,816 )		( 309.82 )
Refractory			1,254		57.00
Variable cost total	22.0x10 <sup>3</sup> t		18,637		847.14



Variable Cost  
(ILD)

Cost Center: Basic Oxygen Furnace 2.15 —MT Production 2,229.6 x 1,000 ton

Item	Quantity	Unit Price (Rs.)	Amount (1,000 Rs.)	Unit Consumpt.	Unit Cost Rs./ton
* Hot metal	2,080.0x10 <sup>3</sup> t	773.36	1,608,562	932.5 kg/t	
* Cold pig iron	50.0x10 <sup>3</sup> t	774.74	38,737	22.5 kg/t	
Scrap (return)	204.8x10 <sup>3</sup> t	174.5	357,424	168.5 kg/t	
Scrap (purchase)	171.0x10 <sup>3</sup> t	2,030	347,130		
(Main material cost)	( 2,595.8x10 <sup>3</sup> t )		( 2,351,873 )	( 1,123.6 kg/t )	( 1,054.84 )
* Burnt lime	258.0x10 <sup>3</sup> t	637.90	164,579	115.7 kg/t	
* Ore	62.4x10 <sup>3</sup> t	146.20	9,123	28.0 kg/t	
* Burn dolomite	22.0x10 <sup>3</sup> t	847.14	18,657	9.5 kg/t	
Fluor spar	8.6x10 <sup>3</sup> t	4,007	34,460	3.9 kg/t	
Ferro-manganese	19.8x10 <sup>3</sup> t	7,800	154,440	8.9 kg/t	
Ferro-silicon	4.7x10 <sup>3</sup> t	13,800	64,860	2.1 kg/t	
Aluminium	0.7x10 <sup>3</sup> t	23,300	16,310	0.3 kg/t	
Coke (breaza)	1.5x10 <sup>3</sup> t	2,684	4,026	0.7 kg/t	
(Sub-material)	( 377.7x10 <sup>3</sup> t )		( 466,435 )		( 209.20 )
By-product (steel)	(-) 25.8x10 <sup>3</sup> t	2,030	(-) 52,374		
By-product (skull)	(-) 17.2x10 <sup>3</sup> t	1,220	(-) 20,984		
By-product (gas)	(-) 357.730x10 <sup>6</sup> kcal		(-) 40,423		
(By-product total)			(-) 113,781		(-) 51.03
(Material cost total)			( 2,704,527 )		( 1,213.01 )
Oxygen	147,154x10 <sup>3</sup> Nm <sup>3</sup>		26,466	65.0 Nm <sup>3</sup> /t	
Nitrogen	20,056x10 <sup>3</sup> Nm <sup>3</sup>		3,613	9.0 Nm <sup>3</sup> /t	
Gas	44,582x10 <sup>6</sup> kcal		5,029	20x10 <sup>3</sup> kcal/t	
Electricity	66,888x10 <sup>3</sup> kWh		16,349	30.0 kWh/t	
Industrial water.	659x10 <sup>6</sup> l		450	0.3x10 <sup>3</sup> l/t	
(Utilities total)			( 51,947 )		( 23.30 )
Main brick	1,100 t	4,000	4,400	0.50 kg/t	
Furnace brick	26,400 t	7,450	196,580	11.9 kg/t	
Ladle brick	970 t	1,200	1,164	0.43 kg/t	
(Refractory total)			( 202,244 )		( 90.71 )
Molten steel					
Variable cost total	2,229.6x10 <sup>3</sup> t		2,968,718		1,327.02
For ingot casting	304.1x10 <sup>3</sup> t		403,546		1,327.02
For 8-L-1 cc	349.0x10 <sup>3</sup> t		463,129		1,327.02
For 8-T-1 cc	260.4x10 <sup>3</sup> t		345,555		1,327.02
For 8-T-2 & 3 cc	1,316.1x10 <sup>3</sup> t		1,746,488		1,327.02

Variable Cost

Cost Center: Ingot Casting 2.15 —MT Production 295.0 x 1,000 ton

Item	Quantity	Unit Price (Rs.)	Amount (1,000 Rs.)	Unit Consumpt.	Unit Cost Rs./ton
* Molten steel	304.1x10 <sup>3</sup> t	1,327.02	403,546		1,367.95
By-product (skull)	(-) 3.0x10 <sup>3</sup> t	1,220	(-) 3,660		
By-product (steel)	(-) 6.1x10 <sup>3</sup> t	2,030	(-) 12,383		
(By-product total)	(-) 9.1x10 <sup>3</sup> t		(-) 16,043		(-) 54.39
(Material cost total)			( 387,503 )		( 1,313.57 )
Ladle brick	1,257 t	2,077	2,618	4.6 kg/t	
Sliding nozzle	177 t	59,200	10,478	0.6 kg/t	
(Refractory total)			( 13,286 )		( 45.07 )
Al-shot	29.5 t	23,300	687	0.1 kg/t	2.33
Ingot mould	6,480 t	6,206	40,277	22.0 kg/t	136.63
Bottom plate	1,032.5 t	6,408	6,615	3.5 kg/t	22.43
Electricity	590x10 <sup>3</sup> kWh		144	2.0 kWh/t	
Gas	2,360x10 <sup>6</sup> kcal		287	8x10 <sup>3</sup> kcal/t	
Oxygen	30x10 <sup>3</sup> Nm <sup>3</sup>		5	0.1 Nm <sup>3</sup> /t	
(Utilities total)			( 416 )		( 1.41 )
Variable cost total	295.0x10 <sup>3</sup> t		446,795		1,521.34
For blooming mill	295.0x10 <sup>3</sup> t		446,795		1,521.34

## Variable Cost

Cost Center: BL-1 cc

2.15 —MT Production 335.0 x 1,000 ton

Item	Quantity	Unit Price (Rs.)	Amount (1,000 Rs.)	Unit Consumpt.	Unit Cost Rs./ton
* Molten steel	349.0x10 <sup>3</sup> t	1,327.02	463,129		1,382.47
By-product (steel)	(-)	2,030	(-)		
By-product (skull)	(-)	1,220	(-)		
By-product (scale)	(-)	30	(-)		
(By-product total)	(-)		(-)		(-)
(Material cost total)			( 444,521 )		( 1,326.93 )
Ladle brick	1,943 t	2,077	4,036	5.8 kg/t	
Sliding nozzle	100.5 t	59,200	5,950	0.3 kg/t	
Fire clay brick	1,340 t	2,077	2,783	4.0 kg/t	
Castable (Hi-Al)	837.5 t	3,800	3,183	2.5 kg/t	
Nozzle (zircon)	40.2 t	61,500	2,472	0.12 kg/t	
(Refractory total)			( 18,424 )		( 55.00 )
LPG	167.5x10 <sup>3</sup> Nm <sup>3</sup>	5,634/10 <sup>3</sup>	910	0.5 m <sup>3</sup> /t	
Reprocessed oil	40,200 ℓ	11.3	454	120 cc/t	
Copper mould	6,700 kg	430	2,881	20.0 g/t	
Al wire					
Burnt paddy	100,500 kg	4.9	492	0.3 kg/t	
Tips	10,720 P	17.4	187	0.032 P/t	
(Sub-material total)			( 4,924 )		( 14.69 )
Electricity	3,350x10 <sup>3</sup> kWh		819	10.0 kWh/t	
Industrial water	134x10 <sup>6</sup> ℓ		90	0.4x10 <sup>3</sup> ℓ/t	
Gas	6,030x10 <sup>6</sup> kcal		681	18x10 <sup>3</sup> kcal/t	
Oxygen	337x10 <sup>3</sup> Nm <sup>3</sup>		67	1.5 Nm <sup>3</sup> /t	
Nitrogen	134x10 <sup>3</sup> Nm <sup>3</sup>		24	0.4 Nm <sup>3</sup> /t	
(Utilities total)			( 1,675 )		( 5.0 )
Variable cost total	335.0x10 <sup>3</sup> t		465,544		1,401.62
For blooming mill	335.0x10 <sup>3</sup> t		465,544		1,401.62

## Variable Cost

Cost Center: BT-1 cc

2.15 —MT Production 250.0 x 1,000 ton

Item	Quantity	Unit Price (Rs.)	Amount (1,000 Rs.)	Unit Consumpt.	Unit Cost Rs./ton
* Molten steel	250.4x10 <sup>3</sup> t	1,327.02	345,555		1,382.22
By-product (steel)	(-)	2,030	(-)		
By-product (skull)	(-)	1,220	(-)		
By-product (scale)	(-)	30	(-)		
(By-product total)	(-)		(-)		(-)
(Material cost total)			( 331,802 )		( 1,327.21 )
Ladle brick	1,450 t	2,077	3,012	5.8 kg/t	
Sliding nozzle	150 t	59,200	8,880	0.6 kg/t	
Fire clay brick	1,500 t	2,077	3,116	6.0 kg/t	
Castable (Hi-Al)	1,123 t	3,800	4,275	4.5 kg/t	
Nozzle (zircon)	22.5 t	61,500	1,384	0.09 kg/t	
(Refractory total)			( 20,667 )		( 82.67 )
LPG					
Reprocessed oil	30,000 ℓ	11.3	339	120 cc/t	
Copper mould	5,000 kg	430	2,150	20.0 g/t	
Al wire	25 t	23,200	583	100.0 g/t	
Burnt paddy	75,000 kg	4.9	368	0.3 kg/t	
Tips	8,000 P	17.4	139	0.032 P/t	
(Sub-material total)			( 3,579 )		( 14.31 )
Electricity	2,500x10 <sup>3</sup> kWh		611	10.0 kWh/t	
Industrial water	100x10 <sup>6</sup> ℓ		57	0.4x10 <sup>3</sup> ℓ/t	
Gas	4,500x10 <sup>6</sup> kcal		509	18x10 <sup>3</sup> kcal/t	
Oxygen	25x10 <sup>3</sup> Nm <sup>3</sup>		5	1.0 Nm <sup>3</sup> /t	
Nitrogen	100x10 <sup>3</sup> Nm <sup>3</sup>		18	0.4 Nm <sup>3</sup> /t	
(Utilities total)			( 1,210 )		( 4.84 )
Variable cost total	250.0x10 <sup>3</sup> t		357,259		1,429.03
For Merchant & Bar	250.0x10 <sup>3</sup> t		357,259		1,429.03

Variable Cost

Cost Center: BT-2 & 3 cc 2.15 —MT Production 1,270.0 x 1,000 ton

Item	Quantity	Unit Price (Rs.)	Amount (1,000 Rs.)	Unit Consumpt.	Unit Cost Rs./ton
* Molten steel	1,316.0x10 <sup>3</sup> t	1,327.02	1,745,488		1,375.19
By-product (steel)	(-) 15.7x10 <sup>3</sup> t	2,030	(-) 31,871		
By-product (skull)	(-) 19.8x10 <sup>3</sup> t	1,220	(-) 24,156		
By-product (scale)	(-) 10.6x10 <sup>3</sup> t	30	(-) 318		
(By-product total)	(-) 46.1x10 <sup>3</sup> t		(-) 56,345		44.37
(Material cost)			( 1,850,143 )		( 1,330.82 )
Ladle brick	7,368 t	2,077	15,299	5.8 kg/t	
Sliding nozzle	254 t	59,200	15,037	0.2 kg/t	
Fire clay brick	6,350 t	2,077	13,189	5.0 kg/t	
Castable (Hi-Al)	3,837 t	3,800	14,961	3.1 kg/t	
Nozzle (Zircon)	63.5 t	61,500	3,905	0.05 kg/t	
(Refractory total)			( 62,391 )		( 49.13 )
LPG	381x10 <sup>3</sup> Nm <sup>3</sup>	5,434/10 <sup>3</sup>	2,070	0.3 m <sup>3</sup> /t	
Reprocessed oil	152,400 ℓ	11.3	1,722	120 cc/t	
Copper mould	25,400 kg	430	10,922	20.0 g/t	
Al wire	127 t	23,300	2,958	100 g/t	
Burnt paddy	381,000 kg	4.9	1,867	0.3 kg/t	
Tips	40,640 P	17.4	707	0.032 P/t	
(Sub-material cost)			( 20,247 )		( 15.94 )
Electricity	12,700x10 <sup>3</sup> kWh		3,104	10.0 kWh/t	
Industrial water	508x10 <sup>6</sup> ℓ		341	0.4x10 <sup>3</sup> ℓ/t	
Gas	20,320x10 <sup>6</sup> kcal		2,296	16x10 <sup>3</sup> kcal/t	
Oxygen	1,270x10 <sup>3</sup> Nm <sup>3</sup>		229	1.0 Nm <sup>3</sup> /t	
Nitrogen	508x10 <sup>3</sup> Nm <sup>3</sup>		91	0.4 Nm <sup>3</sup> /t	
(Utilities total)			( 6,061 )		( 4.77 )
Variable cost total	1,270.0x10 <sup>3</sup> t		1,778,842		1,400.66
For No. 1 New Bar	615.0x10 <sup>3</sup> t		861,408		1,400.66
For No. 2 New Bar	655.0x10 <sup>3</sup> t		917,434		1,400.66

Variable Cost

Cost Center: Blooming Mill 2.15 —MT Production 603.0 x 1,000 ton

Item	Quantity	Unit Price (Rs.)	Amount (1,000 Rs.)	Unit Consumpt.	Unit Cost Rs./ton
* Ingot steel	295.0x10 <sup>3</sup> t	1,521.34	448,795		1,554.23
By-product (scale)	(-) 8.9x10 <sup>3</sup> t	30	(-) 267		
By-product (scrap)	(-) 14.8x10 <sup>3</sup> t	2,030	(-) 30,044		
(By-product total)	(-) 23.7x10 <sup>3</sup> t		(-) 30,311		( (-) 111.72 )
(Material cost)	( 271.3x10 <sup>3</sup> t )		( 418,484 )		( ( 1,542.52 ) )
* Cast bloom	335.0x10 <sup>3</sup> t	1,401.62	469,544		1,415.57
By-product (scale)	(-) 1.3x10 <sup>3</sup> t	30	(-) 39		
By-product (scrap)	(-) 2.0x10 <sup>3</sup> t	2,030	(-) 4,060		
(By-product total)	(-) 3.3x10 <sup>3</sup> t		(-) 4,089		( (-) 12.36 )
(Material cost)	( 331.7x10 <sup>3</sup> t )		( 465,445 )		( ( 1,403.21 ) )
Roll	36,180 kg	20	724	0.06 kg/t	1.20
Consumables	—	—	3,280	—	5.44
Gas	230,346x10 <sup>6</sup> kcal		26,029	382x10 <sup>3</sup> kcal/t	
Electricity	14,842x10 <sup>3</sup> kWh		3,852	24.78 kWh/t	
Industrial water	241x10 <sup>6</sup> ℓ		162		
(Utilities total)			( 29,843 )		( 49.49 )
Variable cost total	603.0x10 <sup>3</sup> t		917,776		1,522.02
For billet mill (from ingot)	264.0x10 <sup>3</sup> t		422,042		1,596.54
For HSM (from BL-cc)	276.0x10 <sup>3</sup> t		402,778		1,459.34
For No. 2 New Bar (from BL-cc)	55.7x10 <sup>3</sup> t		81,285		1,459.34
For No. 2 New Bar (from ingot)	7.3x10 <sup>3</sup> t		11,671		1,596.64

Variable Cost

Cost Center: Billet Mill

2.15 —MT Production 249.5 x 1,000 ton

Item	Quantity	Unit Price (Rs.)	Amount (1,000 Rs.)	Unit Consumpt.	Unit Cost Rs./ton
* Bloom	264.0x10 <sup>3</sup> t	1,598.64	422,062		1,651.55
By-product (scrap)	(-) 2.6x10 <sup>3</sup> t	30	78		
By-product (scrap)	(-) 11.9x10 <sup>3</sup> t	2,030	24,157		
(By-product total)	(-) 14.5x10 <sup>3</sup> t		(-) 24,235		(-) 97.13
(Material cost)			( 397,807 )		( 1,594.42 )
Roll	37,425 kg	25	936	0.15 kg/t	3.75
Consumables			2,355		9.44
Electricity	5,512x10 <sup>3</sup> kWh		1,616	25.5 kWh/t	
Industrial water	508x10 <sup>6</sup> l		341	0.4x10 <sup>3</sup> l/t	
(Utilities total)			( 1,957 )		( 7.84 )
Variable cost total	249.5x10 <sup>3</sup> t		403,055		1,615.45
For Merchant	11.0x10 <sup>3</sup> t		17,770		1,615.45
For Sales (billet)	238.5x10 <sup>3</sup> t		385,285		1,615.45

Variable Cost

Cost Center: Merchant & Bar

2.15 —MT Production 250.0 x 1,000 ton

Item	Quantity	Unit Price (Rs.)	Amount (1,000 Rs.)	Unit Consumpt.	Unit Cost Rs./ton
* Billet	11.0x10 <sup>3</sup> t	1,615.45	17,770		
* Billet (BT-1CC)	250.0x10 <sup>3</sup> t	1,429.03	357,258		
(Total)	( 261.0x10 <sup>3</sup> )		( 375,028 )		( 1,500.11 )
By-product (scrap)	(-) 5.2x10 <sup>3</sup> t	30	156		
By-product (scrap)	(-) 5.8x10 <sup>3</sup> t	2,030	11,774		
(By-product total)	(-) 11.0x10 <sup>3</sup> t		(-) 11,930		(-) 47.72
(Material cost)			( 363,098 )		( 1,452.39 )
Roll	55,000 kg	28	1,540	0.22 kg/t	6.16
Consumables			5,325		21.30
Gas	100,000x10 <sup>6</sup> kcal		11,300	400x10 <sup>3</sup> kcal/t	
Electricity	15,025x10 <sup>3</sup> kWh		3,673	80.1 kWh/t	
Industrial water	40x10 <sup>6</sup> l		27		
Steam	40,000 t		3,675	0.16 t/t	
(Utilities total)			( 18,675 )		( 74.70 )
Variable cost total	250.0x10 <sup>3</sup> t		388,538		1,554.55
For Sales	250.0x10 <sup>3</sup> t		388,538		1,554.55

## Variable Cost

Cost Center: No. 1 New Bar

2.15 —MT Production 600.0 x 1,000 ton

Item	Quantity	Unit Price (Rs.)	Amount (1,000 Rs.)	Unit Consumpt.	Unit Cost Rs./ton
* Cast billet	615.0x10 <sup>3</sup> t	1,400.66	861,408		1,435.68
By-product (scale)	(-) 6.1x10 <sup>3</sup> t	30	(-) 183		
By-product (scrap)	(-) 8.9x10 <sup>3</sup> t	2,030	(-) 18,067		
(By-product total)	(-) 15.0x10 <sup>3</sup> t		(-) 18,250		(-) 30.42
(Material cost)			( 843,158 )		( 1,465.26 )
Roll	180,000 kg	28	5,040	0.3 kg/t	8.40
Consumables	—	—	12,780	—	21.30
Gas	162,000x10 <sup>6</sup> kcal		18,306	270x10 <sup>3</sup> kcal/t	
Electricity	54,000x10 <sup>3</sup> kWh		13,189	90.0 kWh/t	
Industrial water	300x10 <sup>6</sup> ℓ		202	0.5x10 <sup>3</sup> ℓ/t	
(Utilities total)			( 31,707 )		( 52.85 )
Variable cost total	600.0x10 <sup>3</sup> t		892,685		1,487.81
For Sales	600.0x10 <sup>3</sup> t		892,685		1,487.81

## Variable Cost

Cost Center: No. 2 New Bar

2.15 —MT Production 700.0 x 1,000 ton

Item	Quantity	Unit Price (Rs.)	Amount (1,000 Rs.)	Unit Consumpt.	Unit Cost Rs./ton
* Cast billet (BT-3)	665.0x10 <sup>3</sup> t	1,400.66	917,434		
* Billet (BT-1)	55.7x10 <sup>3</sup> t	1,469.34	81,285		
* Billet (Ingots)	7.3x10 <sup>3</sup> t	1,588.64	11,671		
(Billet total)	( 718.0x10 <sup>3</sup> t )	( 1,407.23 )	( 1,010,390 )		( 1,443.41 )
By-product (scale)	(-) 7.2x10 <sup>3</sup> t	30	(-) 216		
By-product (scrap)	(-) 10.8x10 <sup>3</sup> t	2,030	(-) 21,924		
(By-product total)	(-) 18.0x10 <sup>3</sup> t		(-) 22,140		(-) 31.63
(Material cost)			( 988,250 )		( 1,411.78 )
Roll	210,000 kg	28	5,880	0.3 kg/t	8.40
Consumables	—	—	14,910	—	21.30
Gas	189,000x10 <sup>6</sup> kcal		21,367	270x10 <sup>3</sup> kcal	
Electricity	63,000x10 <sup>3</sup> kWh		15,389	90.0 kWh/t	
Industrial water	350x10 <sup>6</sup> ℓ		235	0.5x10 <sup>3</sup> ℓ/t	
(Utilities total)			( 36,991 )		( 52.85 )
Variable cost total	700.0x10 <sup>3</sup> t		1,045,031		1,494.33
For Sales	700.0x10 <sup>3</sup> t		1,045,031		1,494.33

Variable Cost		2.15 -MT Production 250.0 x 1,000 ton				
Cost Center: Heavy Structural		Quantity	Unit Price (Rs.)	Amount (1,000 Rs.)	Unit Consumpt.	Unit Cost Rs./ton
* Bloom		276.0x10 <sup>3</sup> t	1,459.34	402,778		1,611.11
By-product (scale)		(-) 5.4x10 <sup>3</sup> t	30	(-) 162		
By-product (scrap)		(-) 20.6x10 <sup>3</sup> t	2,030	(-) 41,818		
(By-product total)		(-) 26.0x10 <sup>3</sup> t		(-) 41,980		(-) 167.92
(Material cost)				( 350,798 )		( 1,443.19 )
Roll		375,000 kg	20	7,500	1.5 kg/t	30.00
Consumables				8,763		27.05
Gas		100,000x10 <sup>6</sup> kcal		11,300	400x10 <sup>3</sup> kcal/t	
Electricity		29,650x10 <sup>3</sup> kWh		7,247	118.8 kWh/t	
Industrial water		220x10 <sup>6</sup> ℓ		148		
Steam		32,500 t		2,986	0.13 t/t	
(Utilities total)				( 21,681 )		( 86.73 )
Variable cost total		250.0x10 <sup>3</sup> t		395,742		1,586.97
For sales		250.0x10 <sup>3</sup> t		395,742		1,586.57

Variable Cost		2.15 -MT Generation 1,041,793x10 <sup>3</sup> kWh				
Cost Center: Power Plant		Quantity	Unit Price (Rs.)	Amount (1,000 Rs.)	Unit Consumpt.	Unit Cost Rs./ton
Gas		2,983,586x10 <sup>6</sup> kcal	113	235,445		
Industrial water		6,251x10 <sup>6</sup> ℓ	0.672	4,202		
Electricity		10,418x10 <sup>3</sup> kWh	0.244	2,544		
Variable cost total		1,041,793x10 <sup>3</sup> kWh		242,191		0.232

Variable Cost		2.15 -MT Purchase 0 Own Gene. 1,041,793x10 <sup>3</sup> kWh Distribution 990,843x10 <sup>3</sup> kWh				
Cost Center: Power Distribution		Quantity	Unit Price (Rs.)	Amount (1,000 Rs.)	Unit Consumpt.	Unit Cost Rs./ton
Purchased		0		0		
Own		1,041,793x10 <sup>3</sup> kWh	0.232	242,191		
(Total)		( 1,041,793x10 <sup>3</sup> kWh )	( 0.232 )	( 242,191 )		
Variable cost total		990,843x10 <sup>3</sup> kWh		242,191		0.244

Variable Cost  
Cost Center: Industrial Water      2.15 —MT      Distribution 22,873x10<sup>6</sup> ₹

Item	Quantity	Unit Price (₹.)	Amount (1,000 ₹.)	Unit Consumpt.	Unit Cost ₹./ton
Electricity Consumables	10,132x10 <sup>3</sup> kWh	0.244	2,472		
			12,900		
Variable cost total	22,873x10 <sup>6</sup> ₹		15,372		0.672

Variable Cost  
Cost Center: Oxygen & Nitrogen      2.15 —MT      Generation 183,944x10<sup>3</sup> Nm<sup>3</sup>  
Distribution 181,229x10<sup>3</sup> Nm<sup>3</sup>

Item	Quantity	Unit Price (₹.)	Amount (1,000 ₹.)	Unit Consumpt.	Unit Cost ₹./ton
Electricity	129,000x10 <sup>3</sup> kWh	0.244	31,476		
Industrial water	1,728x10 <sup>6</sup> ₹	0.672	1,156		
Variable cost total	181,229x10 <sup>3</sup> Nm <sup>3</sup>		32,632		0.180

Variable Cost  
Cost Center: Filtered Water      2.15 —MT      Distribution 9,409x10<sup>6</sup> ₹

Item	Quantity	Unit Price (₹.)	Amount (1,000 ₹.)	Unit Consumpt.	Unit Cost ₹./ton
Electricity	8,270x10 <sup>3</sup> kWh	0.244	2,018		
Variable cost total	9,409x10 <sup>6</sup> ₹		2,018		0.214

Variable Cost  
Cost Center: Steam      2.15 —MT      Generation 821,374 t  
Distribution 786,994 t

Item	Quantity	Unit Price (₹.)	Amount (1,000 ₹.)	Unit Consumpt.	Unit Cost ₹./ton
Coal	179,676 t	356	63,865		
Electricity	6,325x10 <sup>3</sup> kWh	0.244	1,543		
Filtered water	739x10 <sup>6</sup> ₹	0.214	158		
Steam	72,198 t	91.88	6,641		
Variable cost total	786,994 t		72,307		91.88





4. Details of Full Cost  
(Step 1, 1.0 MT)



Full Cost

Cost Center: Material Yard 1.0 -MT Production 2,364.3 x 1,000 ton

Item	Quantity	Unit Price (Rs.)	Amount (1,000 Rs.)	Unit Consumpt.	Unit Cost Rs./ton
Ore fine (Sinter)	1,052.4x10 <sup>3</sup> t	112	117,869		
Manganese ore fine (Sinter)	45.7x10 <sup>3</sup> t	183	8,363		
High grade ore (BF)	173.3x10 <sup>3</sup> t	142	24,809		
Low grade ore (BF)	403.2x10 <sup>3</sup> t	135	54,432		
Ore (BOF)	32.0x10 <sup>3</sup> t	145	4,640		
Lime stone (Sinter)	165.3x10 <sup>3</sup> t	190	31,407		
Lime stone (BF)	42.0x10 <sup>3</sup> t	190	7,980		
Lime stone (BOF)	233.0x10 <sup>3</sup> t	250	58,250		
Dolomite stone (Sinter)	154.0x10 <sup>3</sup> t	195	31,980		
Dolomite stone (BOF)	23.8x10 <sup>3</sup> t	200	4,760		
Quartzite (Sinter)	29.6x10 <sup>3</sup> t	155	4,588		
(Material cost total)	( 2,364.3x10 <sup>3</sup> )		( 348,878 )		
Electricity	11,822x10 <sup>3</sup> kWh		7,164	5.0 kWh/t	
(Utilities total)			( 7,164 )		
(Variable cost total)			( 356,042 )		
Labour cost			2,761		
Labour cost (Rep. & maint.)			3,886		
Fixed material cost			11,656		
Depr. & interest			57,026		
Overhead exp.			11,738		
Traffic exp.			25,658		
(Fixed cost total)			( 112,735 )		
Full cost total	2,364.3x10 <sup>3</sup> t		466,777		

Full Cost

Cost Center: Sintering 1.0 -MT Production 1,344.0 x 1,000 ton

Item	Quantity	Unit Price (Rs.)	Amount (1,000 Rs.)	Unit Consumpt.	Unit Cost Rs./ton
* Ore fine	1,052.4x10 <sup>3</sup> t	150.49	158,377	783 kg/t	
* Mang. ore fine	45.7x10 <sup>3</sup> t	245.88	11,237	34 kg/t	
* Lime stone	165.3x10 <sup>3</sup> t	255.30	42,201	123 kg/t	
* Dolomite stone	164.0x10 <sup>3</sup> t	262.01	42,570	122 kg/t	
* Quartzite	29.6x10 <sup>3</sup> t	208.28	6,165	22 kg/t	
Flue dust	26.3x10 <sup>3</sup> t	67	1,762	20 kg/t	
Quick lime	13.3x10 <sup>3</sup> t	---	---	10 kg/t	
(Material cost total)	( 1,497.3x10 <sup>3</sup> t )		( 282,712 )		( 195.47 )
Coke breeze	121.0x10 <sup>3</sup> t	422	51,062	90 kg/t	37.99
Gas	57,200x10 <sup>6</sup> kcal		8,556	50x10 <sup>3</sup> kcal/t	
Electricity	53,760x10 <sup>3</sup> kWh		32,578	40.0 kWh/t	
Industrial water	671x10 <sup>6</sup> l		1,262	0.5x10 <sup>3</sup> l/t	
(Utilities total)			( 42,436 )		( 31.57 )
(Variable cost total)			( 356,210 )		( 265.03 )
Labour cost			2,913		
Labour (Rep. & maint.)			6,474		
Fixed material cost			16,767		
Depr. & interest			87,211		
Overhead exp.			17,804		
Traffic exp.			---		
(Fixed cost total)			( 131,189 )		( 97.60 )
Full cost total	1,344.0x10 <sup>3</sup> t		487,379		362.63

Full Cost

Cost Center: Coke Oven

BOF coke

1.0 -MT Production 792.2 x 1,000 ton

Item	Quantity	Unit Price (Rs.)	Amount (1,000 Rs.)	Unit Consumpt.	Unit Cost Rs./ton
Coal (primate)	685.5x10 <sup>3</sup> t	675	469,213		
Coal (medium)	399.3x10 <sup>3</sup> t	613	244,771		
Coal (blendable)	133.1x10 <sup>3</sup> t	473	62,955		
Coal (Australia)	133.1x10 <sup>3</sup> t	1,020	135,762		
(Coal total)	( 1,331.0x10 <sup>3</sup> t )	( 670.7 )	( 892,702 )		( 1,125.87 )
By-product (gas)	(-) 1,463,776x10 <sup>6</sup> kcal		(-) 165,407		
By-product (coke breeze)	(-) 198.1x10 <sup>3</sup> t	422	(-) 83,498		
By-product (others)			(-) 46,715		
(By-product total)	(-) 295,720 t		(-) 295,720		(-) 375.29
(Material cost total)			( 596,982 )		( 753.58 )
Absorbent oil	399 t	3,027	1,208		
Gas	859,826x10 <sup>6</sup> kcal	113	97,160	646x10 <sup>3</sup> kcal/t	
Electricity	35,837x10 <sup>3</sup> kWh		21,777	27.0 kWh/t	
Steam	612,260 t		62,550	0.461 t/t	
Industrial water	1,351x10 <sup>6</sup> l		2,502	1.0x10 <sup>3</sup> l/t	
Nitrogen	353x10 <sup>3</sup> Nm <sup>3</sup>		468	0.25 Nm <sup>3</sup> /t	
(Utilities total)			( 184,467 )		( 232.85 )
(Variable cost total)			( 781,449 )		( 985.43 )
Labour cost			9,826		
Labour cost (Rep. & maint.)			18,450		
Fixed material cost			47,065		
Depr. & interest			67,103		
Overhead exp.			17,579		
Traffic exp.			22,430		
(Fix cost total)			( 182,453 )		( 230.31 )
Full cost total	BF coke 792.2x10 <sup>3</sup> t		963,902		1,216.74
By-product (screening)	(-) 79.2x10 <sup>3</sup> t		(-) 33,422		
Full cost total	713.0x10 <sup>3</sup> t		930,480		1,305.02
For BF	672.0x10 <sup>3</sup> t		876,974		1,305.02
For sales	41.0x10 <sup>3</sup> t		53,506		1,305.02

Full Cost

Cost Center: Blast Furnace (1)

1.0 -MT Production 1,050.0 x 1,000 ton

Item	Quantity	Unit Price (Rs.)	Amount (1,000 Rs.)	Unit Consumpt.	Unit Cost Rs./ton
* Coke	872.0x10 <sup>3</sup> t	1,305.02	876,974		
* Sinter	1,344.0x10 <sup>3</sup> t	362.53	487,379		
* H. grade ore	173.3x10 <sup>3</sup> t	190.80	33,066		
* L. grade ore	403.2x10 <sup>3</sup> t	181.40	73,139		
Scrap (iron)	14.7x10 <sup>3</sup> t	1,830	25,901		
* Lime stone	42.0x10 <sup>3</sup> t	255.30	10,722		
Other sub-material			17,640		
(Main & sub-material)			( 1,523,821 )		( 1,453.16 )
By-product (slag)	(-) 493.5x10 <sup>3</sup> t	237	(-) 118,950		
By-product (dust)	(-) 26.3x10 <sup>3</sup> t	67	(-) 1,762		
By-product (skull)	(-) 7.8x10 <sup>3</sup> t	1,220	(-) 9,516		
By-product (gas)	(-) 1,757,220x10 <sup>6</sup> kcal	113	(-) 198,566		
(By-product total)			(-) 326,804		(-) 311.24
(Material cost total)			( 1,195,017 )		( 1,141.92 )
Electricity (blower)	115,500x10 <sup>3</sup> kWh		65,991	110.0 kWh/t	110.0 kWh/t
Indust. water (blower)	16x10 <sup>6</sup> l		30	0.015x10 <sup>3</sup> l/t	
Electricity	40,950x10 <sup>3</sup> kWh		24,815	39.0 kWh/t	
Gas	646,800x10 <sup>6</sup> kcal		82,736	616x10 <sup>3</sup> kcal/t	
Steam	48,200 t		4,935	0.046 t/t	
Nitrogen	5,250x10 <sup>3</sup> Nm <sup>3</sup>		7,368	5.0 Nm <sup>3</sup> /t	
Industrial water	3,190x10 <sup>6</sup> l		5,920	3.0x10 <sup>3</sup> l/t	
(Utilities total)			( 195,813 )		( 186.49 )
(Variable cost total)			( 1,394,830 )		( 1,328.41 )
Labour cost			6,225		
Labour cost (Rep. & maint.)			20,753		
Fixed material cost			51,409		
Depr. & interest			239,585		
Special repair			20,300		
Overhead exp.			49,149		
Traffic exp.			18,623		
(Fixed cost total)			( 408,144 )		( 386.80 )
Full cost total	1,050.0x10 <sup>3</sup> t		1,800,974		1,715.21

Full Cost  
Cost Center: Blast Furnace (2)  
1.0 -MT Production 1,029.0 x 1,000 ton

Item	Quantity	Unit Price (Rs.)	Amount (1,000 Rs.)	Unit Consumpt.	Unit Cost Rs./ton
* Hot metal	1,050.0x10 <sup>3</sup> t	1,715.21	1,800,974		1,750.22
By-product (iron scrap)	(-)	1,830	(-) 32,757		
By-product (skull)	(-)	1,220	(-) 3,782		
(By-product total)	(-)		(-) 36,539		(-) 35.51
Full cost total	1,029.0x10 <sup>3</sup> t		1,764,435		1,714.71
For BOF (LD)	966.4x10 <sup>3</sup> t		1,657,094		1,714.71
For cold pig	62.6x10 <sup>3</sup> t		107,341		1,714.71

Full Cost  
Cost Center: Cold Pig Iron  
1.0 -MT Production 62.6 x 1,000 ton

Item	Quantity	Unit Price (Rs.)	Amount (1,000 Rs.)	Unit Consumpt.	Unit Cost Rs./ton
* Hot metal	62.6x10 <sup>3</sup> t	1,714.71	107,341		1,714.71
Electricity	313x10 <sup>3</sup> kWh		190	5.0 kWh/t	
Industrial water	12x10 <sup>6</sup> g		23		
(Utilities total)			(-) 213		(-) 3.41
(Variable cost total)			(-) 107,554		(-) 1,718.12
Labour cost			334		
Labour (Rep. & maint.)			351		
Fixed material cost			1,049		
Depre. & interest			-		
Overhead exp.			126		
Traffic exp.			2,280		
(Fixed cost total)			(-) 4,140		(-) 66.13
Full cost total	62.6x10 <sup>3</sup> t		111,654		1,784.25
For BOF (LD)	23.3x10 <sup>3</sup> t		41,573		1,784.25
For sales	39.3x10 <sup>3</sup> t		70,121		1,784.25

## Full Cost

## Cost Center: Burnt Lime

1.0 —MT Production 120.0 x 1,000 ton

Item	Quantity	Unit Price (Rs.)	Amount (1,000 Rs.)	Unit Consumpt.	Unit Cost Rs./ton
* Lime stone	233.0x10 <sup>3</sup> t	335.92	78,269		652.24
Nitrogen	3x10 <sup>3</sup> Nm <sup>3</sup>		4	0.02 Nm <sup>3</sup> /t	
Industrial water	106.0x10 <sup>6</sup> l		199	0.8x10 <sup>3</sup> l/t	
Gas	135,263x10 <sup>6</sup> kcal		17,302	1,017x10 <sup>3</sup> kcal/t	
Electricity	8,645x10 <sup>3</sup> kWh		5,239	65.0 kWh/t	
(Utilities total)			( 22,744 )		( 189.54 )
Refractory (brick)	40 t	4,000	160	0.33 kg/t	1.33
(Variable cost total)			( 101,173 )		( 843.11 )
Labour cost			634		
Labour cost (Rep. & maint.)			1,503		
Fixed material cost			4,487		
Depre. & interest			20,257		
Overhead exp.			4,127		
Traffic exp.			—		
(Fixed cost total)			( 31,018 )		( 258.48 )
Full cost total	120.0x10 <sup>3</sup> t		132,191		1,101.59
For 60F (LD)	120.0x10 <sup>3</sup> t		132,191		1,101.59

## Full Cost

## Cost Center: Dolomite

1.0 —MT Production 10.0 x 1,000 ton

Item	Quantity	Unit Price (Rs.)	Amount (1,000 Rs.)	Unit Consumpt.	Unit Cost Rs./ton
* Dolomite stone	23.8x10 <sup>3</sup> t	288.74	6,396		639.60
Electricity	285x10 <sup>3</sup> kWh		173	28.48 kWh/t	
Industrial water	3x10 <sup>6</sup> l		6		
Steam	2,200 t		225	0.22 t/t	
Gas	25,000x10 <sup>6</sup> kcal		3,198		
(Utilities total)			( 3,602 )		( 360.20 )
Refractory			570		57.00
(Variable cost total)			( 10,568 )		( 1,056.80 )
Labour cost			423		
Labour cost (Rep. & maint.)			326		
Fixed material cost			974		
Depre. & interest			46		
Overhead exp.			147		
Traffic exp.			—		
(Fixed cost total)			( 1,916 )		( 191.60 )
Full cost total	10.0x10 <sup>3</sup> t		12,484		1,248.40
For 60F (LD)	10.0x10 <sup>3</sup> t		12,484		1,248.40

Full Cost

Cost Center: Basic Oxygen Furnace (1) 1.0 -MT Production 1,036.3 x 1,000 ton

Item	Quantity	Unit Price (Rs.)	Amount (1,000 Rs.)	Unit Consumpt.	Unit Cost Rs./ton
* Hot metal	966.4x10 <sup>3</sup> t	1,714.71	1,657,094	932.6 kg/t	
* Cold pig iron	23.3x10 <sup>3</sup> t	1,784.25	41,573	22.5 kg/t	
Scrap (return)	168.4x10 <sup>3</sup> t	1,877	316,084	168.6 kg/t	
Scrap (purchase)	6.3x10 <sup>3</sup> t	2,030	12,789		
(Main material cost)	( 1,164.4x10 <sup>3</sup> t)		( 2,027,550 )	(1,123.7 kg/t)	( 1,956.53 )
* Burnt lime	120.0x10 <sup>3</sup> t	1,101.59	132,191	115.8 kg/t	
* Ore	32.0x10 <sup>3</sup> t	194.84	6,235	30.9 kg/t	
* Burnt dolomite	10.0x10 <sup>3</sup> t	1,248.40	12,484	9.7 kg/t	
Fluorspar	4.0x10 <sup>3</sup> t	4,007	16,028	3.9 kg/t	
Ferro-manganese	8.8x10 <sup>3</sup> t	7,900	69,640	8.5 kg/t	
Ferro-silicon	1.5x10 <sup>3</sup> t	13,800	20,700	1.4 kg/t	
Aluminium	0.2x10 <sup>3</sup> t	23,300	4,660	0.2 kg/t	
Coke (breaze)	0.7x10 <sup>3</sup> t	2,584	1,879	0.7 kg/t	
(Sub-material)	( 177.2x10 <sup>3</sup> t)		( 262,817 )		( 253.61 )
By-product (steel scrap)	(-)	2,030	(-) 24,360		
By-product (skull)	(-)	1,220	(-) 9,760		
By-product (gas)	(-)		(-) 18,780		
(By-product total)	(-186.202x10 <sup>6</sup> kcal)		(-) 52,900 )		( (-) 51.05 )
(Material cost total)			( 2,237,467 )		( 2,158.09 )
Oxygen	68,396x10 <sup>3</sup> Nm <sup>3</sup>		96,227	66.0 Nm <sup>3</sup> /t	
Nitrogen	9,327x10 <sup>3</sup> t		13,123	9.0 Nm <sup>3</sup> /t	
Gas	20,726x10 <sup>6</sup> kcal		2,652	20x10 <sup>3</sup> kcal/t	
Electricity	31,089x10 <sup>3</sup> kWh		18,839	30.0 kWh/t	
Industrial water	311x10 <sup>3</sup> ℓ		585	0.3x10 <sup>3</sup> ℓ/t	
(Utilities total)			( 13,1426 )		( 126.83 )
Main brick	520 t	4,000	2,080	0.50 kg/t	
Furnace brick	12,300 t	7,450	91,635	11.9 kg/t	
Ladle brick	450 t	1,200	540	0.43 kg/t	
(Refractory total)			( 94,255 )		( 90.25 )
(Variable cost total)			( 2,463, 148 )		( 2,376.87 )

Full Cost

Cost Center: Basic Oxygen Furnace (2) 1.0 -MT Production 1,036.3 x 1,000 ton

Item	Quantity	Unit Price (Rs.)	Amount (1,000 Rs.)	Unit Consumpt.	Unit Cost Rs./ton
Labour cost			5,616		
Labour cost (Rep. & maint.)			9,111		
Fixed material cost			29,817		
Depre. & interest			124,437		
Overhead exp.			38,916		
Traffic exp.			11,106		
(Fixed cost total)			( 217,003 )		( 209.40 )
Full cost total	1,036.3x10 <sup>3</sup> t		2,590,151		2,586.27
For ingot casting	531.0x10 <sup>3</sup> t		1,373,309		2,586.27
For B.L.1 cc	297.0x10 <sup>3</sup> t		786,122		2,586.27
For B.T.1 cc	208.3x10 <sup>3</sup> t		538,720		2,586.27

Full Cost

Cost Center: Ingot Casting 1.0 - MT Production 515.0 x 1,000 ton

Item	Quantity	Unit Price (Rs.)	Amount (1,000 Rs.)	Unit Consumpt.	Unit Cost Rs./ton
* Molten steel	531.0x10 <sup>3</sup> t	2,586.27	1,373,309		2,666.62
By-product (skull)	(-) 5.3x10 <sup>3</sup> t	1,220	(-) 6,466		
By-product (steel)	(-) 10.7x10 <sup>3</sup> t	2,030	(-) 21,721		
By-product (scale)	(-) 16.0x10 <sup>3</sup> t		(-) 28,187		(-) 54.73
(Material cost total)			( 1,345,122 )		( 2,511.89 )
Ladle brick	2,369 t	2,077	4,920	4.6 kg/t	9.55
Sliding nozzle	309 t	59,200	18,293	0.6 kg/t	35.52
(Refractory total)			( 23,213 )		( 45.07 )
Al-shot	51.5 t	23,300	1,200	0.1 kg/t	2.33
Ingot mould	11,330 t	6,206	70,314	22.0 kg/t	136.53
Bottom plate	1,803 t	6,408	11,554	3.5 kg/t	22.43
(total)			( 83,068 )		( 161.29 )
Electricity	1,030x10 <sup>3</sup> kWh		624	2.0 kWh/t	
Gas	4,120x10 <sup>6</sup> kcal		528	8x10 <sup>3</sup> kcal/t	
Oxygen	52x10 <sup>3</sup> Nm <sup>3</sup>		73	0.1 Nm <sup>3</sup> /t	
(Utilities total)			( 1,225 )		( 2.39 )
(Variable cost total)			( 1,452,628 )		( 2,820.64 )
Labour cost			2,154		
Labour cost (Rep. & maint.)			986		
Fixed material cost			2,242		
Depra. & interest			13,324		
Overhead exp.			3,035		
Traffic exp.			1,685		
(Fixed cost total)			( 23,426 )		( 45.48 )
Full cost total	515.0x10 <sup>3</sup> t		1,476,054		2,866.12
For blooming mill	515.0x10 <sup>3</sup> t		1,476,054		2,866.12

Full Cost

Cost Center: BL-1 cc 1.0 - MT Production 285.0 x 1,000 ton

Item	Quantity	Unit Price (Rs.)	Amount (1,000 Rs.)	Unit Consumpt.	Unit Cost Rs./ton
* Molten steel	297.0x10 <sup>3</sup> t	2,586.27	788,122		2,695.16
By-product (steel)	(-) 5.1x10 <sup>3</sup> t	2,030	(-) 10,353		
By-product (skull)	(-) 4.5x10 <sup>3</sup> t	1,220	(-) 5,490		
By-product (scale)	(-) 2.4x10 <sup>3</sup> t	30	(-) 72		(-) 55.94
(By-product total)			(-) 15,915		(- 2,638.32 )
(Material cost total)			( 752,207 )		
Ladle brick	1,653 t	2,077	3,433	5.8 kg/t	
Sliding nozzle	85.5 t	59,200	5,062	0.3 kg/t	
Fire clay brick	1,140 t	2,077	2,368	4.0 kg/t	
Castable (Hi-Al)	712.5 t	3,800	2,708	2.5 kg/t	
Nozzle (Zircon)	34.2 t	81,500	2,703	0.12 kg/t	
(Refractory total)			( 15,674 )		( 55.0 )
LPG	142.5x10 <sup>3</sup> Nm <sup>3</sup>	5,434/10 <sup>3</sup>	774	0.5 m <sup>3</sup> /t	
Repared oil	34,200 l	11.3	386	120 cc/t	
Copper mould	5,700 kg	430	2,451	20 g/t	
Al-wire					
Burnt paddy	85,500 kg	4.8	419	0.3 kg/t	
Tips	9,120 P	17.4	159	0.032 P/t	
(Sub-material total)			( 4,189 )		( 14.71 )
Electricity	2,850x10 <sup>3</sup> kWh		1,727	10.0 kWh/t	
Industrial water	114x10 <sup>6</sup> l		214	0.4x10 <sup>3</sup> l/t	
Gas	5,130x10 <sup>6</sup> kcal		657	18x10 <sup>3</sup> kcal/t	
Oxygen	456x10 <sup>3</sup> Nm <sup>3</sup>		642	1.6 Nm <sup>3</sup> /t	
Nitrogen	114x10 <sup>3</sup> Nm <sup>3</sup>		160	0.4 Nm <sup>3</sup> /t	
(Utilities total)			( 3,400 )		( 11.93 )
(Variable cost total)			( 775,470 )		( 2,720.96 )
Labour cost			2,373		
Labour cost (Rep. & maint.)			2,126		
Fixed material cost			5,968		
Depra. & interest			29,076		
Overhead exp.			5,188		
Traffic exp.			1,264		
(Fixed cost total)			( 46,995 )		( 164.86 )
Full cost total	285.0x10 <sup>3</sup> t		822,465		2,885.84
For blooming mill	285.0x10 <sup>3</sup> t		822,465		2,885.84



Full Cost

Cost Center: BT-1 cc		1.0 -MT Production 200.0 x 1,000 ton			
Item	Quantity	Unit Price (Rs.)	Amount (1,000 Rs.)	Unit Consumpt.	Unit Cost Rs./ton
* Molten steel	208.3x10 <sup>3</sup> t	2,566.27	538,720		2,693.80
By-product (steel)	(-) 3.5x10 <sup>3</sup> t	2,030	(-) 7,105		
By-product (skull)	(-) 3.1x10 <sup>3</sup> t	1,229	(-) 3,782		
By-product (scale)	(-) 1.7x10 <sup>3</sup> t	30	(-) 51		
(By-product total)	(-) 8.3x10 <sup>3</sup> t		(-) 10,938		(-) 54.69
(Material cost total)			(-) 527,782		(-) 2,638.91
Ladle brick	1,160 t	2,007	2,409	5.8 kg/t	
Sliding nozzle	120 t	59,200	7,104	0.6 kg/t	
Fire clay brick	1,200 t	2,077	2,492	6.0 kg/t	
Castable (Hi-Al)	900 t	3,800	3,420	4.5 kg/t	
Nozzle (Zircon)	18 t	61,500	1,107	0.09 kg/t	
(Refractory total)			(-) 16,532		(-) 82.66
LPG					
Rapeseed oil	24,000 l	11.3	271	120 cc/t	
Copper mould	4,000 kg	430	1,720	20 g/t	
Al wire	20.0 t	23,300	466	100 g/t	
Burnt packy	60,000 kg	4.9	294	0.3 kg/t	
Tips	6,400 P	17.4	111	0.032 P/t	
(Sub-material total)			(-) 2,862		(-) 14.31
Electricity	2,000x10 <sup>3</sup> kWh	1,212	1,212	10.0 kWh/t	
Industrial water	80x10 <sup>6</sup> l	150	150	0.4x10 <sup>6</sup> l/t	
Gas	3,600x10 <sup>6</sup> kcal	461	461	18x10 <sup>6</sup> kcal/t	
Oxygen	20x10 <sup>3</sup> Nm <sup>3</sup>	28	28	0.1 Nm <sup>3</sup> /t	
Nitrogen	80x10 <sup>3</sup> Nm <sup>3</sup>	113	113	0.4 Nm <sup>3</sup> /t	
(Utilities total)			(-) 1,964		(-) 9.82
Labour cost			1,566		
Labour cost (Rep. & maint.)			2,056		
Fixed material cost			5,876		
Depre. & interest			28,559		
Overhead exp.			5,950		
Traffic exp.			874		
(Fixed cost total)			(-) 44,981		(-) 224.91
Full cost total	200.0x10 <sup>3</sup> t		594,121		2,970.61
For No. 1 New Bar	200.0x10 <sup>3</sup> t		594,121		2,970.61

Full Cost

Cost Center: Blooming mill		1.0 -MT Production 756.0 x 1,000 ton			
Item	Quantity	Unit Price (Rs.)	Amount (1,000 Rs.)	Unit Consumpt.	Unit Cost Rs./ton
* Ingot steel	515.0x10 <sup>3</sup> t	2,866.12	1,476,054		(-) 3,114.04
By-product (scale)	(-) 15.4x10 <sup>3</sup> t	30	(-) 462		
By-product (scrap)	(-) 25.6x10 <sup>3</sup> t	2,030	(-) 51,968		
(By-product total)	(-) 41.0x10 <sup>3</sup> t		(-) 52,430		((-) 110.61)
(Material cost)	(-) 474.0x10 <sup>3</sup> t		(-) 1,423,624		((-) 3,003.43)
* Cast bloom	285.0x10 <sup>3</sup> t	2,885.84	822,465		(-) 2,916.54
By-product (scale)	(-) 1.2x10 <sup>3</sup> t	30	(-) 36		
By-product (scrap)	(-) 1.8x10 <sup>3</sup> t	2,030	(-) 3,654		
(By-product total)	(-) 3.0x10 <sup>3</sup> t		(-) 3,690		((-) 13.08)
(Material cost)	(-) 282.0x10 <sup>3</sup> t		(-) 818,775		((-) 2,903.46)
Roll	52,920 kg	20	1,058	0.07 kg/t	1.40
Consumable			4,113		5.44
Gas	334,908x10 <sup>6</sup> kcal		42,841	443x10 <sup>6</sup> kcal/t	
Electricity	18,734x10 <sup>3</sup> kWh		11,353	24.78 kWh/t	
Industrial water	302x10 <sup>6</sup> l		568		
(Utilities total)			(-) 54,762		(-) 72.44
(Variable cost total)			(-) 2,302,332		(-) 3,045.41
Labour cost			3,056		
Labour cost (Rep. & maint.)			12,694		
Fixed material cost			31,322		
Depre. & interest			45,427		
Overhead exp.			11,277		
Traffic exp.			4,634		
(Fixed cost total)			(-) 108,420		(-) 143.41
Full cost total	756.0x10 <sup>3</sup> t		2,410,752		3,188.83
For billet mill	480.0x10 <sup>3</sup> t		1,547,935		3,224.86
For HSM	276.0x10 <sup>3</sup> t		862,817		3,126.15

Full Cost

Cost Center: Sillet Mill 1.0 -MT Production 453.6 x 1,000 ton

Item	Quantity	Unit Price (Rs.)	Amount (1,000 Rs.)	Unit Consumpt.	Unit Cost Rs./ton
* Bloom	480.0x10 <sup>3</sup> t	3,224.86	1,547,935		3,412.55
By-product (scale)	(-) 4.8x10 <sup>3</sup> t	30	(-) 144		
By-product (scrap)	(-) 21.6x10 <sup>3</sup> t	2,030	(-) 43,848		
(By-product total)	(-) 26.4x10 <sup>3</sup> t		(-) 43,992		(-) 96.98
(Material cost)			( 1,503,943)		( 3,315.57)
Roll	68,040 kg	25	1,701	0.15 kg/t	3.75
Consumables			4,282		9.44
Electricity	12,020x10 <sup>3</sup> kWh		7,284	26.5 kWh/t	
Industrial water	327x10 <sup>6</sup> l		615		( 17.42)
(Utilities total)			( 7,899)		
(Variable cost total)			( 1,517,825)		( 3,346.18)
Labour cost			3,050		
Labour cost (Rep. & maint.)			5,938		
Fixed material cost			12,667		
Dpre. & interest			5,452		
Overhead exp.			2,661		
Traffic exp.			19,297		
(Fixed cost total)			( 49,095)		( 108.23)
Full cost total	453.6x10 <sup>3</sup> t		1,566,920		3,454.41
For sheet bar	127.0x10 <sup>3</sup> t		438,710		3,454.41
For merchant	261.0x10 <sup>3</sup> t		901,600		3,454.41
For No. 1 New Bar	60.0x10 <sup>3</sup> t		207,265		3,454.41
For sales	5.6x10 <sup>3</sup> t		19,345		3,454.41

Full Cost

Cost Center: Sheet Mill 1.0 -MT Production 100.0 x 1,000 ton

Item	Quantity	Unit Price (Rs.)	Amount (1,000 Rs.)	Unit Consumpt.	Unit Cost Rs./ton
* Sheet bar	127.0x10 <sup>3</sup> t	3,454.41	438,710		4,237.10
By-product (scale)	(-) 0.5x10 <sup>3</sup> t	30	(-) 15		
By-product (scrap)	(-) 26.5x10 <sup>3</sup> t	2,030	(-) 53,795		
(By-product total)	(-) 27.0x10 <sup>3</sup> t		(-) 53,810		(-) 538.10
(Material cost)			( 384,900)		( 3,849.00)
Roll	265,000 kg	20	5,200	2.65 kg/t	53.00
Consumables			420		4.2
Gas	140,000x10 <sup>6</sup> kcal		17,908	1,400x10 <sup>3</sup> kcal/t	
Electricity	20,110x10 <sup>3</sup> kWh		12,185	201.1 kWh/t	
Industrial water					
Steam	30,000 t		3,065	0.3 t/t	
(Utilities total)			( 33,159)		( 331.59)
(Variable cost total)			( 423,779)		( 4,237.79)
Labour cost			12,775		
Labour cost (Rep. & maint.)			8,071		
Fixed material cost			4,916		
Dpre. & interest			4,379		
Overhead exp.			4,649		
Traffic exp.			6,484		
(Fixed cost total)			( 41,274)		( 412.74)
Full cost total	100.0x10 <sup>3</sup> t		495,053		4,650.53
For galvanized sheet	30.0x10 <sup>3</sup> t		139,516		4,650.53
For sales (black sheet)	70.0x10 <sup>3</sup> t		325,537		4,650.53

Full Cost

Cost Center: Galvanized Sheet 1.0—MT Production 30.0 x 1,000 ton

Item	Quantity	Unit Price (Rs.)	Amount (1,000 Rs.)	Unit Consumpt.	Unit Cost Rs./ton
* Black sheet	30.0x10 <sup>3</sup> t	4,650.53	139,516		4,650.53
Sealer	2,452.5 t	29,500	72,349	81.75 kg/t	2,411.63
By-product (zinc dross)	(-) 270 t	19,000	(-) 5,130		
By-product (skimming)	(-) 188 t	2,500	(-) 488		
(By-product total)			(-) 5,619		(-) 187.29
Consumables			720		24.00
Industrial water (Utilities total)	160x10 <sup>6</sup> l		301		10.03
(Utilities total)			(-) 301		(-) 10.03
(Variable cost total)			(-) 207,267		(-) 6,908.50
Labour cost			12,887		
Labour (Rep. & maint.)			6,720		
Fixed material cost			1,049		
Depre. & interest					
Overhead exp.			3,514		
Traffic exp.			1,092		
(Fixed cost total)			(-) 25,362		(-) 845.40
Full cost total	30.0x10 <sup>3</sup> t		232,629		7,754.30
For sales	30.0x10 <sup>3</sup> t		232,629		7,754.30

Full Cost

Cost Center: Merchant & Bar 1.0—MT Production 250.0 x 1,000 ton

Item	Quantity	Unit Price (Rs.)	Amount (1,000 Rs.)	Unit Consumpt.	Unit Cost Rs./ton
* Sillet	261.0x10 <sup>3</sup> t	3,454.41	901,600		3,606.40
By-product (scale)	(-) 5.2x10 <sup>3</sup> t	30	(-) 156		
By-product (scrap)	(-) 5.8x10 <sup>3</sup> t	2,000	(-) 11,774		
(By-product total)	(-) 11.0x10 <sup>3</sup> t		(-) 11,930		(-) 47.72
(Material cost)			(-) 889,670		(-) 3,558.68
Roll	55,000 kg	28	1,540	0.22 kg/t	6.16
Consumables			5,325		21.30
Gas	100,000x10 <sup>6</sup> kcal		12,792	400x10 <sup>3</sup> kcal/t	
Electricity	15,025x10 <sup>3</sup> kWh		9,105	60.1 kWh/t	
Industrial water	35x10 <sup>6</sup> l		66		
Steam	40,000 t		4,088	0.16 t/t	
(Utilities total)			(-) 26,051		(-) 104.20
Labour cost			4,465		
Labour cost (Rep. & maint.)			6,416		
Fixed material cost			12,719		
Depre. & interest			10,390		
Overhead exp.			3,920		
Traffic exp.			10,262		
(Fixed cost total)			(-) 48,172		(-) 192.89
Full cost total	250.0x10 <sup>3</sup> t		970,758		3,883.03
For sales	250.0x10 <sup>3</sup> t		970,758		3,883.03

## Full Cost

## Cost Center: No. 1 New Bar 1.0 -MT Production 254.0 x 1,000 ton

Item	Quantity	Unit Price (Rs.)	Amount (1,000 Rs.)	Unit Consumpt.	Unit Cost Rs./ton
* Cast billet (BTCC-1)	200.0x10 <sup>3</sup> t	2,970.61	594,121		
Billet	80.0x10 <sup>3</sup> t	3,454.41	207,265		
(Total)	( 280.0x10 <sup>3</sup> t)		( 801,386 )		( 3,155.06 )
By-product (scale)	(-) 2.5x10 <sup>3</sup> t	30	(-) 78		
By-product (scrap)	(-) 3.4x10 <sup>3</sup> t	2,030	(-) 6,902		
(By-product total)	(-) 6.0x10 <sup>3</sup> t		((-) 6,980 )		((-) 27.48 )
(Material cost)			( 794,406 )		( 3,127.58 )
Roll	76,200 kg	28	2,134	0.3 kg/t	8.40
Consumables	—	—	5,410	—	21.30
Gas	66,580x10 <sup>6</sup> kcal		8,773	270x10 <sup>3</sup> kcal/t	
Electricity	22,860x10 <sup>3</sup> kWh		13,853	90.0 kWh/t	
Industrial water	127x10 <sup>6</sup> l		239	0.5x10 <sup>3</sup> l/t	
(Utilities total)			( 22,865 )		( 90.02 )
(Variable cost total)			( 824,815 )		( 3,247.30 )
Labour cost			4,175		
Labour cost (Rep. & maint.)			12,558		
Fixed material cost			31,296		
Depr. & interest			147,595		
Overhead exp.			30,288		
Traffic exp.			9,882		
(Fixed cost total)			( 285,794 )		( 928.33 )
Full cost total	254.0x10 <sup>3</sup> t		1,060,609		4,175.63
Per scale	254.0x10 <sup>3</sup> t		1,060,609		4,175.63

## Full Cost

## Cost Center: Heavy Structural 1.0 -MT Production 250.0 x 1,000 ton

Item	Quantity	Unit Price (Rs.)	Amount (1,000 Rs.)	Unit Consumpt.	Unit Cost Rs./ton
* Bloom	276.0x10 <sup>3</sup> t	3,126.15	862,817		3,451.27
By-product (scale)	(-) 5.4x10 <sup>3</sup> t	30	(-) 162		
By-product (scrap)	(-) 20.6x10 <sup>3</sup> t	2,030	(-) 41,818		
(By-product total)	((-) 26.0x10 <sup>3</sup> t)		((-) 41,980 )		((-) 167.92 )
(Material cost)			( 820,837 )		( 3,283.35 )
Roll	375,000 kg	20	7,500	1.5 kg/t	30.00
Consumables	—	—	5,762	—	27.05
Gas	100,000x10 <sup>6</sup> kcal		12,792	400x10 <sup>3</sup> kcal/t	
Electricity	29,650x10 <sup>3</sup> kWh		17,967	118.6 kWh/t	
Industrial water	220x10 <sup>6</sup> l		414		
Steam	32,500 t		3,321	0.13 t/t	
(Utilities total)			( 34,534 )		( 137.93 )
(Variable cost total)			( 869,594 )		( 3,476.38 )
Labour cost			5,580		
Labour cost (Rep. & maint.)			8,468		
Fixed material cost			20,298		
Depr. & interest			12,631		
Overhead exp.			5,102		
Traffic exp.			11,842		
(Fixed cost total)			( 65,022 )		( 260.08 )
Full cost total	250.0x10 <sup>3</sup> t		934,616		3,738.46
Per scale	250.0x10 <sup>3</sup> t		934,616		3,738.46

Full Cost

Cost Center: Gas

Item	Quantity	Unit Price (Rs.)	Amount (1,000 Rs.)	Unit Consumpt.	Unit Cost Rs./ton
Gas	3,387,198x10 <sup>6</sup> kcal	113	382,753		113.00
Labour cost			1,089		
Labour cost (Rep. & maint.)			3,546		
Fixed material cost			9,605		
Depr. & interest			36,288		
Overhead exp.			---		
Traffic exp.			---		
(Fixed cost total)			( 50,528 )		( 14.92 )
Full cost total	3,387,198x10 <sup>6</sup> kcal		433,281		127.92

Full Cost

Cost Center: Power Plant

Item	Quantity	Unit Price (Rs.)	Amount (1,000 Rs.)	Unit Consumpt.	Unit Cost Rs./ton
Gas	773,085x10 <sup>6</sup> kcal		98,890		
Industrial water	2,319x10 <sup>6</sup> x		4,361		
Electricity	3,865x10 <sup>3</sup> kWh	0.608	2,343		
(Variable cost total)			( 105,594 )		( 0.273 )
Labour cost			3,193		
Labour cost (Rep. & maint.)			6,386		
Fixed material cost			15,582		
Depr. & interest			71,475		
Overhead exp.			---		
Traffic exp.			---		
(Fixed cost total)			( 96,546 )		( 0.250 )
Full cost total	386,543x10 <sup>3</sup> kWh		202,240		0.523

1.0 -MT

Generation 386,543x10<sup>3</sup> kWh

Full Cost

Cost Center: Power Distribution

Item	Quantity	Unit Price (Rs.)	Amount (1,000 Rs.)	Unit Consumpt.	Unit Cost Rs./ton
Purchased	153,405x10 <sup>3</sup> kWh	0.577	88,515		
Own	386,543x10 <sup>3</sup> kWh	0.523	202,240		
(Variable cost total)	( 539,948x10 <sup>3</sup> kWh )	( 0.538 )	( 290,755 )		( 0.565 )
Labour cost			724		
Labour cost (Rep. & maint.)			1,349		
Fixed material cost			3,499		
Depr. & interest			15,232		
Overhead exp.			---		
Traffic exp.			---		
(Fixed cost total)			( 20,884 )		( 0.041 )
Full cost total	514,236x10 <sup>3</sup> kWh		311,619		0.606

1.0 -MT

Generation 3400,268x10<sup>6</sup> kcal  
Distribution 3,387,198x10<sup>6</sup> kcal

Full Cost

Cost Center: Industrial Water 1.0 -MT Distribution 10,084x10<sup>6</sup> ℓ

Item	Quantity	Unit Price (Rs.)	Amount (1,000 Rs.)	Unit Consumpt.	Unit Cost Rs./ton
Electricity	4,487x10 <sup>3</sup> kWh	0.506	2,707		
Consumables (Variable cost total)			6,000 ( 8,707 )		( 0.863 )
Labour cost			867		
Labour cost (Rep. & maint.)			1,080		
Fixed material cost			2,588		
Depra. & interest			5,707		
Overhead exp.			—		
Traffic exp.			—		
(Fixed cost total)			( 10,252 )		( 1.017 )
Full cost total	10,084x10 <sup>6</sup> ℓ		19,959		1.880

Full Cost

Cost Center: Steam 1.0 -MT

Generation 883,275 t  
Distribution 845,612 t

Item	Quantity	Unit Price (Rs.)	Amount (1,000 Rs.)	Unit Consumpt.	Unit Cost Rs./ton
Coal	193,349 t	356	68,332		
Electricity	6,808x10 <sup>3</sup> kWh		4,124		
Filtered water	796x10 <sup>6</sup> ℓ		738		
Steam	80,352 t	102.18	8,210		
(Variable cost total)			( 81,904 )		( 96.86 )
Labour cost			—		
Labour cost (Rep. & maint.)			1,127		
Fixed material cost			3,373		
Depra. & interest			—		
Overhead exp.			—		
Traffic exp.			—		
(Fixed cost total)			( 4,500 )		( 5.22 )
Full cost total	845,612 t		86,404		102.18

Full Cost

Cost Center: Filtered Water 1.0 -MT Distribution 9,466x10<sup>6</sup> ℓ

Item	Quantity	Unit Price (Rs.)	Amount (1,000 Rs.)	Unit Consumpt.	Unit Cost Rs./ton
Electricity	8,321x10 <sup>3</sup> kWh	0.606	5,042		0.533
Labour cost			578		
Labour cost (Rep. & maint.)			775		
Fixed material cost			1,524		
Depra. & interest			853		
Overhead exp.			—		
Traffic exp.			—		
(Fixed cost total)			( 3,730 )		( 0.394 )
Full cost total	9,466x10 <sup>6</sup> ℓ		8,772		0.927

Full Cost

Cost Center: Oxygen & Nitrogen 1.0 -MT

Generation 84,836x10<sup>3</sup> Nm<sup>3</sup>  
Distribution 84,031x10<sup>3</sup> Nm<sup>3</sup>

Item	Quantity	Unit Price (Rs.)	Amount (1,000 Rs.)	Unit Consumpt.	Unit Cost Rs./ton
Electricity	60,000x10 <sup>3</sup> kWh		36,399		
Industrial water (Variable cost total)	800x10 <sup>6</sup> ℓ		1,504 ( 37,863 )		( 0.451 )
Labour cost			1,120		
Labour cost (Rep. & maint.)			4,908		
Fixed material cost			13,677		
Depra. & interest			80,596		
Overhead exp.			—		
Traffic exp.			—		
(Fixed cost total)			( 20,367 )		( 0.243 )
Full cost total	84,031x10 <sup>3</sup> Nm <sup>3</sup>		119,224		1.407