RAW MATERIALS

General

The major Raw Materials required for production of Pellets by the Grate chain technology are graded Iron Ore fines and Bentonite. Coke/H.S.D./L.D.O. is being used as a Fuel.

IRON ORE

The quality requirement of Sized ore for sponge iron production can be classified into:-

1) Physical requirements:-

The optimum tumbler strength of the ore should be < 70 percent minimum, Depending on the reducibility, closely calibrated ores in the size range of 0 to 5 mm generally used.

2) Metallurgical requirements:-

The ore should be highly reducible, thermally stable and have a low tendency for sticking and disintegration during heating and reduction.

3) Chemical requirements:--

Apart from the removal of oxygen, no other major chemical change takes place in direct reduction. The gangue material in sponge iron, originating from Iron Ore, namely, silica and alumina and the sulphur and phosphorous contents adversely affect the economics in subsequent steel making operation. Therefore, the ore should be high in iron content and low in gangue,

FUEL

The Coke / H.S.D./ L.D.O. is used as a Prime Fuel.

BENTONITE

2% of the mixed raw materials is bentonite to improve the makeup of raw materials' sizes of green ball and increase the strength of both green balls and dried balls.

SOURCES OF RAW MATERIAL

SOURCES OF SUPPLY OF IRON ORE

The rich iron ore deposits are available in the OMC, ORISSA area. The source of supply for the plant would be from one or more of the mines.-

Large deposits of high grade iron ores available in this region. The total reserves are estimated to be 999 million tons as follows-

	Mllion tons
High grade ore (above 65%)	280.00
Medium grade ore (62-65%)	1916.00
Low grade ore (< 62%)	737.00
Unclassified	351.00
Blue dust & black	11.00
Total	3295.00

As per the Survey conducted by the Indian Bureau of Mines (IBM) in April, 1995, India had 10,052 million tones of Recoverable reserves of Hematite and 3,408 Million Tones of Magnetite. While Zone 'A' comprising of Bihar & Orissa is the largest Hematite Ore bearing Zone in the country with reserves of 5,951 Million Tones consisting mainly of Medium Grade & Low Grade Ore (Iron content 65% and below), Madhya Pradesh has the largest quantity of High Grade Ore reserves (Iron content greater than 65%) in the country at 570 Million Tones. Karnataka has the highest reserves of Magnetite at 2,784 Million tones followed by Andhra Pradesh and Goa.

RESERVES OF IRON ORE AS ON 01.04.2000

As per the National Mineral inventory prepared by Indian Bureau of Mines, Nagpur, the total recoverable reserves of Haematite ores in the country as on 01.4.2000 are placed at 9919 million tones and that of Magnetite ores 3516 million tones. The reserves of haematite ore are mainly located in the states of Orissa, Jharkhan, Chhattisgarh, Karnataka, Goa, Maharashtra, Andhra Pradesh, Rajasthan and Bihar. The grade-wise reserves of 65% fE (Lumps) are about 834 Million tones, 62% to 65% Fe are 2383 million tones and the rest below 62% fE. The reserves of high-grade fines are estimated to be 129 million tones and that of medium grade fines are 2251 million tones. The fines of low grade are placed at 123 million tones. The Iron ore lumps and fines (high grade, medium grade, low grade), unclassified, blue dust etc, have also been estimated as balance reserves. The reserves of metallurgical grade magnetite are placed at 1441 million tones against 2061 million tones in unclassified grade. These magnetite reserves are mainly estimated in the state of Karnataka, Andhra Pradesh, Goa, Kerala, Jharkhand, Assam, Tamil nadu, Maharashtra and Rajasthan.

PRODUCTION AND DESPATCHES DURING 2004-05

The remaining about 2% of total production would be from Andhra Pradesh
Production of Iron Ore (including concentrates) during the year 2004-05 is estimated at 140.2 million tones as against 120.6 tonnes in the previous year, statewise production indicates the following –

1) Karnataka would continue to be the leading producing state accounting for 382 million tones (27.2 %) of the Total production.

2) Orissa with 37.8 million tons (26.9%).

3) Chhattisgarh with 24.83 million tones (17.7%).

4) Goa with 20.30 million tones (14.5%).

5) Jharkhand with 16.0 million tones (11.4%)

The remaining about 2% of total production would be from be from Andhra Pradesh. M.P., Maharashtra, and Rajasthan. Despatches of ore (including concentrates) for 2004-05 are estimated at 136.2 million tones. The dispatches of Iron ore for internal consumption and export would be 79.6 million tones and 56.6 million tones respectively.

1.1 Production and Despatches of Iron Ore from 2002-03 to 2004-05

Year/Period	**Production**		**Despatches**		
	Quantity (MT)	Value (Rs in Crores)	Total (MT)	For Internal consumption (MT)	For Export (MT)
2002-2003	99.10	2964.86	102.60	56.60	46.00
2003-2004 (P)	120.61	3698.74	120.40	71.60	48.80
2004-2005 (E)	140.20	5379.56	136.20	79.60	56.60

(P) Provisional (E) Estimated (MT) Million Tonnes

PRODUCTION SCALE & PRODUCTION PLAN

1. Working Mode

Working mode is continuous, main machine's working days are 300. Three shifts a day and eight hours per shift.

2. Product Plan

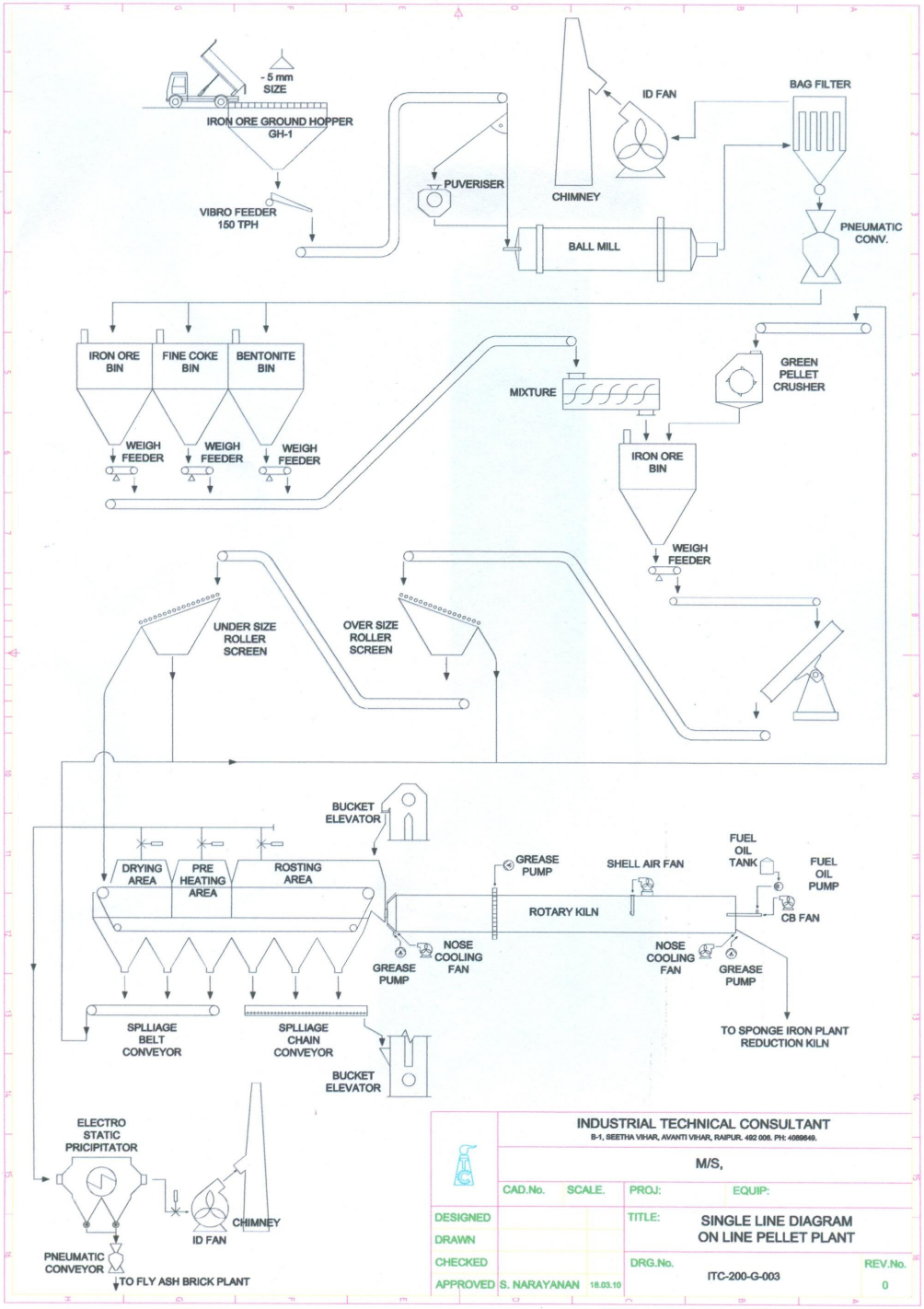
The production line produces acid pellet. The size of pellet product is 5-20 mm, among which 10-20mm accounts for 80%.

The quality of pellet are purely depends upon the quality of Iron Ore Fines.

3. Process Flow

Process Flow Chart

The process flow chart is given below –


- 5 mm SIZE
IRON ORE GROUND HOPPER GH-1
VIBRO FEEDER 150 TPH
PUVERISER
ID FAN
CHIMNEY
BAG FILTER
PNEUMATIC CONV.
BALL MILL
IRON ORE BIN
FINE COKE BIN
BENTONITE BIN
WEIGH FEEDER
WEIGH FEEDER
WEIGH FEEDER
MIXTURE
GREEN PELLET CRUSHER
IRON ORE BIN
WEIGH FEEDER
UNDER SIZE ROLLER SCREEN
OVER SIZE ROLLER SCREEN
BUCKET ELEVATOR
DRYING AREA
PRE HEATING AREA
ROSTING AREA
GREASE PUMP
SHELL AIR FAN
FUEL OIL TANK
FUEL OIL PUMP
ROTARY KILN
CB FAN
NOSE COOLING FAN
GREASE PUMP
NOSE COOLING FAN
GREASE PUMP
TO SPONGE IRON PLANT REDUCTION KILN
SPLLIAGE BELT CONVEYOR
SPLLIAGE CHAIN CONVEYOR
BUCKET ELEVATOR
ELECTRO STATIC PRICIPITATOR
CHIMNEY
ID FAN
PNEUMATIC CONVEYOR
TO FLY ASH BRICK PLANT
INDUSTRIAL TECHNICAL CONSULTANT
B-1, SEETHA VIHAR, AVANTI VIHAR, RAIPUR. 492 006. PH: 4089849.
M/S,
CAD.No.
SCALE.
PROJ:
EQUIP:
DESIGNED
DRAWN
CHECKED
APPROVED S. NARAYANAN 18.03.10
TITLE: SINGLE LINE DIAGRAM ON LINE PELLET PLANT
DRG.No. ITC-200-G-003
REV.No. 0

4 Main Process Technique & Equipment

The main workshops of pelletizing production line include: Ground Hopper, Ball Mill, Stock House, Mixer, Iron Ore hopper, Disc Pelletiser, Oversize roller screen, Undersize Roller Screen, Moving Grate Chain , Pre-heater.

4.1 Ground Hopper

Iron Ore is fed to the Ground Hopper, from there; it goes to the Ball mill through Belt conveyor.

4.2 Ball Mill

The Iron ore is being fed to the Ball mill for crushing by a belt conveyer for further grinding and blending to increase the specific surface area of iron ore fine granule.

The particle size < 1 mm is now collected from Ball mill through Bag filter and Conveyed to the Iron Ore Bin of Raw material Stock House through Pneumatic Conveying System.

4.3 Raw Material Stock House

There are one iron ore concentrate proportioning bin, one bentonite bin and One Coke Bin under which there is belt conveyer and a electronic belt scale.

The bentonite bin is equipped with a sensor detecting the level of materials in bin and commanding the operation of material supply system and therefore the proportion ratio to be set, controlled and regulated automatically. Bentonite to be transferred into the bin pneumatically, once it is full and the transferring pump to be stopped.

Under bentonite bin there is a speed-adjustable screw feeder and adding dosage of bentonite is 2% of the concentrate. There is also a bag filter at the top of the bin.

4.5 Mixure

Weigh Feeders are provided below the Storage Bins. The required quantity of Raw materials are discharged from bins through Weigh feeders and conveyed to the Mixer through common Conveyor for mixing.

4.6 Pelletizing Building

The blended materials to be carried by a belt conveyer onto the upper part of the pelletizing building and discharged into blending bin, under which, disc pelletizers are kept.

The blending bin is equipped with a level indicator and a 1.0 m wide conveyer together with a electronic conveyer scale from where the blended materials to be fed onto pelletizing disc, whose speed and tilting angle are both adjustable.

A moderate amount of water to be added during pelletization process, to ensure the required moisture in the blended materials. Green balls produced by pelletizing discs to be collected by a belt conveyer and transferred to the green ball screening and distribution system.

4.7 Green Ball Screening & Distributing System

It consists of big ball roll screen, wide belt conveyer, roller conveyer and returning charge belt conveyer.

The oversized (+ 20mm) green balls to be collected by a belt conveyer and conveyed back to be reused while the downsized (- 20mm) to be conveyed by the wide belt conveyer to the roller conveyer.

The speed of wide belt conveyer is regulated by a frequency modulator. The roller conveyer is being used for the separation and rejection of the small balls of -5mm and at same time distribute the balls of 5-20mm onto the chain grate. The downsized (-5 mm) green balls to be collected by a belt conveyer and conveyed

back to be reused

4.8 Induration Kiln

The roasting system is made up of the two major machines: chain grate, and Induration Kiln. Green balls to be dried and preheated at chain grate and followed by roasting & consolidating in rotary kiln and then it is Fed to the Rotary Kiln of Sponge Iron Plant for making Sponge Iron Pellets.

VENTILATION & DE-DUSTING

1.1 Ventilation

In order to eliminate excess heat in rooms, ventilating system is equipped in drying machinery room and chain grate room. Two sets of cooling fan are equipped on Induration Kiln operating platform.

1.2 Air Adjustment

Air conditioner is equipped in main control room, raw material control room and part of operation rooms.

1.3 Environmental Dedusting

Flue gas from Kiln will enter to Electrostatic Precipitator through I.D. fan.

Original concentration: 150 g/Nm3
Efficiency of dedusting: >98%

After dedusting system, gas was discharged through chimney. The height of Chimney is based on the local pollution control norms.

POWER SUPPLY

For successful running of the unit the most important factor is the availability of Raw Materials, as well as Utilities & Power, which are required to efficiently run the Equipment.

These two have been kept for most in mind and for this purpose the proposal are: -

Power: -

To ensure continuous & un-interrupted power supply the stipulated inputs a provision has made for installation of H.T. Line from State Electricity Board and also provision has made for D.G. Set.

Telecommunication

Telephone exchange shall be located in main control room. There are 60 sets of programming control exchanger in telephone exchange room for production scheduling and administration communication of the whole plant.

Industrial TV System

In order to meet with the request of modernized management and to inspect and control key production element, to find out production aspect, to discover and deal with problems occurred in production, and to increase production efficiency. The whole system to be equipped with Industrial TV monitoring device located in main control room.

AUTOMATION & INSTRUMENTS

1 Scope of Design

. Proportioning system
. Drying machinery system
. Pelletization system
. Chain grate system
. Induration Kiln system
. Public medium system
Circulating water pump house

1.1 Automation Equipment Capacity

Necessary inspection and controlling method shall be taken to ensure safe and reliable operation.

Central Control Room is set for the Grate-kiln pellet production line. Computer will be used to realize data selection, treatment, monitoring and control, and to meet with auto-control requirement.

The main characteristic of controlling system:
(1) Perfect functions: sequence control, continuous control, as well as display, printing, alarming, historical data storage, etc.;

(2) With CRT display to eliminate stimulated devices of instrument disc, etc. in the mail control room; to improve communication between man and machinery and monitoring function to make more flexible and convenient operation;

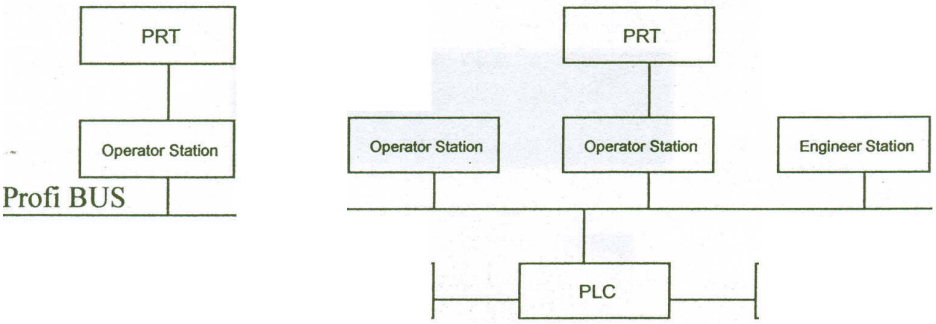
(3) With flexible compound method and high reliable hardware, labor intensity has been eased, so production rate has been increased and quality of product has been ensured.
General instrument is adopted in circulating water pump house. Instrument room is designed, data is displayed, regulated, alarmed, interlocked and accumulated, etc. on the disk.

1.2 Computer

According to the property of this project, combining with substantial condition, grate-kiln pellet production line adopts grade I computerized controlling system and reserves grade II interface in the same time. TCP/IP protocol is adopted for communication.

Incorporated controlling system EIS is used for basic automation, which is in charge of auto-control for main production lines of proportioning system, drying system, blender mixer, pelletization, chain grate, rotary kiln, rotary cooler, etc.; equipped with one set of main PLC station, two sets of remote I/O stations; three sets of operator station and, one set of engineer station in Central Control Room.

1.3 Topo l Network of Automation System



Remote I/O Remote I/O

All process data will be operated, recorded, alarmed, regulated and interlocked respectively according to its importance. Economic statistics data will be accumulated with computer. All production reports of shift, daily, monthly, alarm and abnormal cases, etc. will be printed out so as to optimize management. All drawings of team status, potential, alarm, flow chart, etc. will be displayed on operation station. When in alarming case, in addition to screen display and printing out, sonic and light signal will be sent at the same time