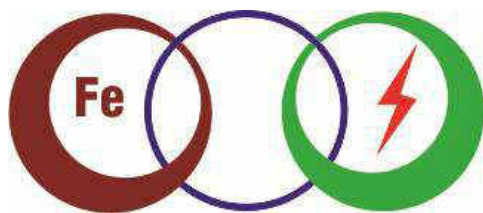




Fe Techno Engineering and Power Solutions

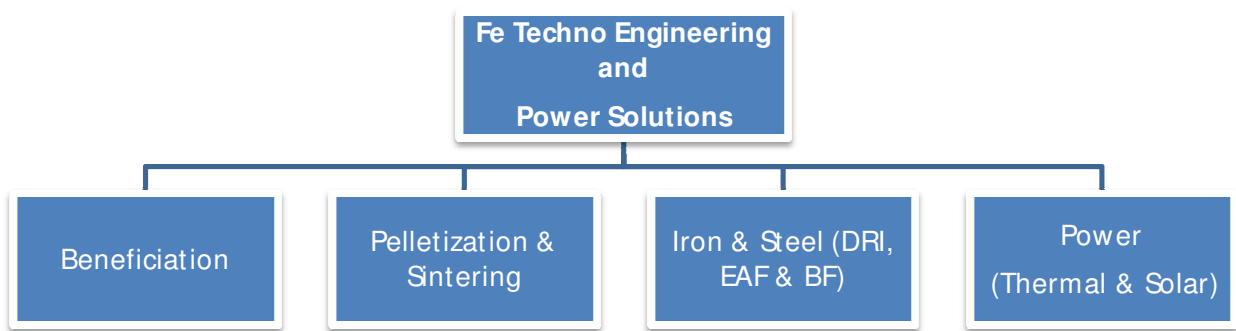


Introduction

Fe Techno Engineering and Power Solutions is a Engineering Company in India engaged in providing turnkey solutions for Beneficiation, Pelletising, Iron making & Power plants. Unmatched knowledge of process technology, result-oriented solutions, proficiency in plant design, detailed plant engineering, and project management are our strengths. Our core competency lies in integrated design, detailed engineering and consultancy services from concept to Commissioning.

Fe Techno Engineering and Power Solutions is a multidisciplinary team of professionals with in-depth understanding of the latest trends and technological advancements in steel and power sector. They have prior experience from India's leading companies such as KIOCL, JSW, JSPL and ESSAR Steels etc. To deliver excellence in the steel sector we have technological tie up with some of the world's leading equipment supply firm Uralmash Machine building Corporation – Russia for core equipment supply for pelletising and sintering, and with VRPL- India for EPC projects.

Engineering and supervision services



We Offer

- Feasibility Study for new project proposals.
- Process Design & construction engineering for civil, structural, mechanical, electrical, instrumentation and process automation.
- Project Conceptual design, providing basic & detailed design and engineering for complete Beneficiation & Pelletization plants working on both Straight travelling grate & Rotary kiln technology.
- Basic & detail engineering for power plants, sinter plants, Iron & steel plants.
- Providing EPC based services of iron ore pelletization plant of various capacity, working on Straight Grate Technology, with an annual production capacity of 0.6 MTPY, 1 MTPY, 1.2 MTPY, 2 MTPY 4 MTPY & 5MTPY.
- Providing equipment specification for all process equipment and Procurement assistance for buying new process equipment.
- Equipment quality Inspection services for new equipment at manufacturer's place.
- Supervision of Equipment erection and commissioning.
- Project Management services for setting up the entire plant.
- Plant Operation and process stabilisation assistance.
- Training of plant operation and maintenance personnel working in pellet and beneficiation plants.

Uralmash machine Building corporation

Fe Techno has signed an MOU with Uralmash, Largest steel plant equipment manufacturer in Russia for supply of pelletising and sintering machines of all capacity.

- Uralmash have 75-year experience in development of Metallurgical plants and machinery.
- Have many years of experience in the development and manufacture of straight travelling grate induration machines with effective areas of 108, 189, 306, and 528 M2 and more.
- Since 1964, about 50 complexes with straight travelling grate induration machines were manufactured and commissioned.

Typical plant modules

Type of induration machine	M OK-108	M OK-189	M OK-306	M OK-528
Capacity, MTPA	0.6	1.2	2	4
Production Capacity, t/h	90-110	155	280	520
Working area, m ²	108	189	306	528
Number of gas-air chambers, pcs.	13	21	34	32.5
Number of pallets cars	69	105	157	192
Pallet dimensions, m	3 X 1.5	3.0×1.5	3x1.5	4x1.5
Pallet speed, m/min	0.5-1.5	0.5-2.0	1.5-3.0	2-4.5
Maximum temperature above pellet layer in firing zone, °C	1350	1350	1350	1300
Specific Fuel consumption / tonne of pellets	250000	<250000	<250000	<250000
Specific Power consumption per Tonne of Pellet KWh/T	40	<40	<40	<40
Above values are subject to confirmation after ore testing.				

Iron Ore Pelletization Process

The process of pelletizing process involves mixing of the raw material, forming the green pellets and thermal treatment baking the soft raw pellet to hard spheres.

The pelletizing process has the objective of producing heat hardened pellets in an appropriate range of sizes and with mechanical properties. Iron ore pellets are spheres of typically 6–16 mm to be used as raw material for blast furnaces or in direct reduction of iron. They typically contain 62%-68% Fe and various additive materials for adjusting the chemical composition and the metallurgical properties of the pellets. Typically limestone/dolomite, coal and bentonite are used as additives.

Iron ore pelletization requires ore size of 80% 100 mesh and 100% below 200 mesh.

Ores having higher particle size requires grinding. The size reduction can be achieved by any of the following grinding facilities.

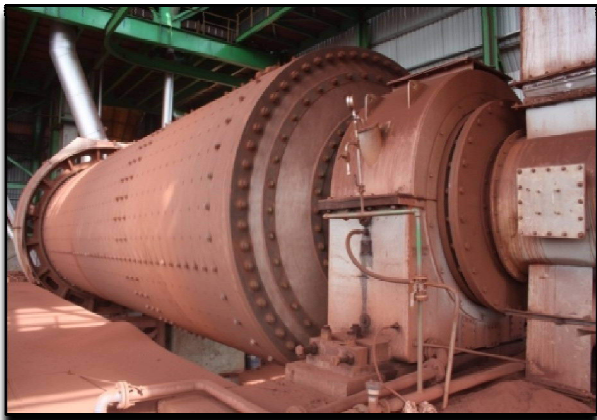
- Wet grinding ball mill & filter
- Dryer & dry grinding ball mill.
- Vertical roller mill.
- HPGR

Dryer



For dry grinding of iron ores the moisture content should be less than 1%. In order to reduce the moisture dryer is used. Hot air generated (HAG) is used to generate hot air for drying. This hot air is passed on iron ores through a rotary shell. The measured quantity of raw iron ore is fed through the dryer in order to have proper control on the moisture. The dried iron ore fines flowing out of the dryer are fed into the ball mill for grinding.

Ball Mill



Ball Mill is used to reduce the size of the iron ore particles and make it suitable for preparing green pellets for induration process. Generally the fineness is measured by a index called blain number. Typically in dry grinding blain number of 1800 to 2200 is maintained. Depending upon the requirement an open circuit or closed circuit can be envisaged in the ball mill.

Similar type of ball mill is used for grinding the iron ore in wet condition. For wet grinding dryer will not be used. The raw ore is directly fed into the mill along with water. The discharged ground ore slurry is passed through filters in order to achieve the moisture of the filter cake between 8-9.5% which will be ideal for making the green balls.

Filters

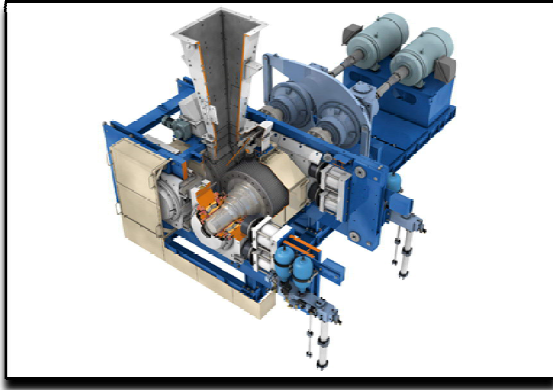


Wet ground slurry form of iron ore is filtered in ordered to remove the excess water and to maintain the moisture in iron ore/filter cake around 8-9.5%.

Different types of filters are used to perform the above operation.

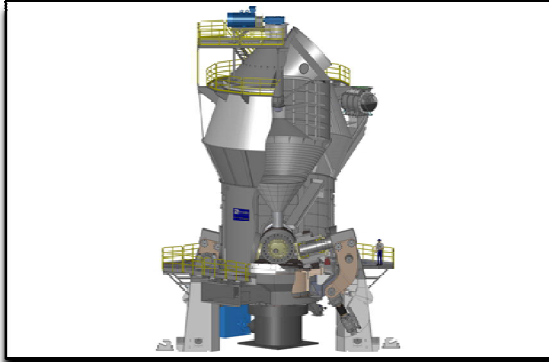
- Horizontal pressure filter
- Vertical filter
- Vacuum disc filter
- Ceramic disc filter
- Belt filter

HPGR



In High pressure grinding iron ore is passed between a set of rollers operated hydraulically. With high pressure pressing, the structure of iron ore is deformed thus reducing the ore size. Depending upon the feed and discharge size requirement there will be one or more passes. Compare to traditional mills the power consumption in the HPGR is very less.

Vertical mill



Vertical roller mill is consisting of a rotating pan along with roller 4-6 rollers which are mechanically or hydraulically pressed each other. Iron ore is passed between the rollers pan and rollers. A speed controlled rotating classifier controls the size reduction of grinding. Depending upon the feed moisture hot air generator is used in mill circuit. If the moisture is less heat generated during the process of grinding is sufficient.

Mixer



Mixer homogenizes the ground ore along with additives and maintains the required moisture for balling.

In case of dry ground ore along with the ground additives water/slurry is added in the mixer in order to maintain the discharge moisture.

In case of filter cake, which has pre occupied moisture, only ground additives are added in the mixer for homogenization. Water / slurry added if required.

Balling Disc



The mixed materials from the mixer are fed to balling disc through surge bins and weigh feeders by belt weigh feeders through. Spherical shaped pellets are formed in the balling disc. The size of the green pellets is depending upon the moisture of mixed feed, bentonite addition, disc angle and rotating speed. The green pellets discharging from the balling discs are discharged to a belt conveyor for onward transportation to the indurating machine.

Charging station



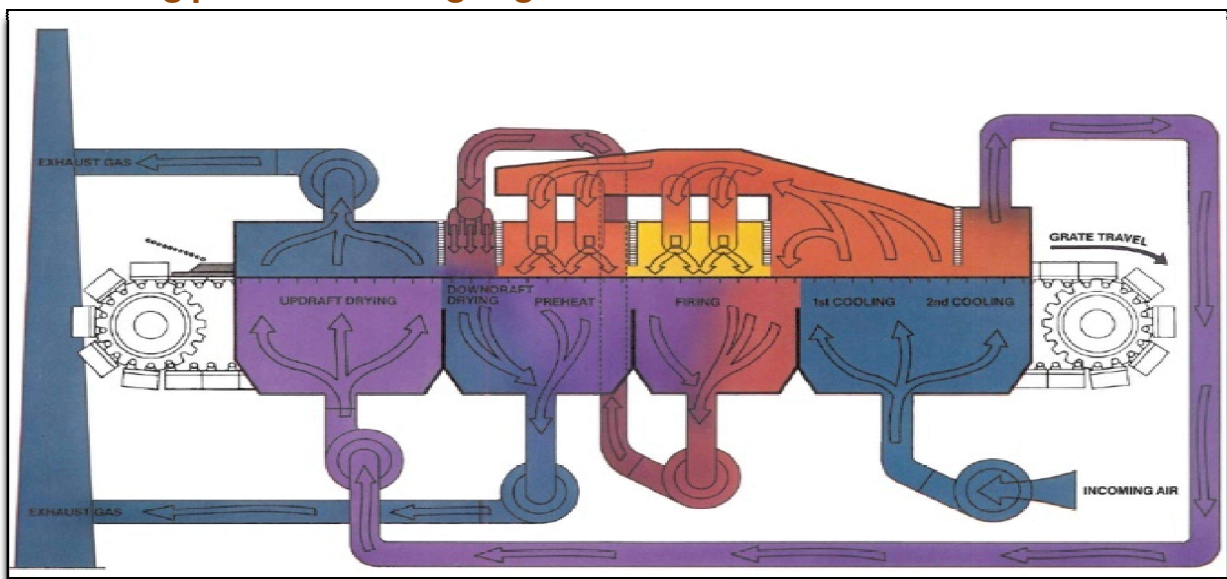
Green pellets discharges from balling disc is conveyor to oscillating or reciprocating conveyor, to spread the green pellets along the width of wide belt conveyor.

Wide belt conveyor which is as wide as the indurating furnace discharges the green pellets on to double deck roller screen.

In the process of balling there will be a wide range of different sizes of green balls are formed. As per the product specification 9-16mm pellets are required. Screening of over sized & undersized green pellets and charging the required size of pellets into Furness done at double deck roller screen.

The over size and under size green pellets are collected from DDRS and sent back to balling disc surge bins through a set of conveyors for recycling.

Indurating process – straight grate



Indurating machine consists of chain of pallet cars which are manufactured using high temperature alloy steel. The green pellets from DDRS are charged on these pallet cars over a hearth layer pellets (layer of fired pellet to protect the pallet car). The car carrying the green pellets enter into indurating furnace.

Indurating furnace consists of five major furnace zones - Up draft drying, down draft drying, preheating, firing and cooling zone. The objective of the process is to transform green pellets into heat hardened pellets by thermal process. The heat is circulated in the above zones by a set of process fans.

Indurating machine



Initial process of straight travelling grate process is to dry the green balls from DDRS in the drying zone, there after it is preheated to 850-950°C. Heat required for drying and pre-heating process is received from furnace and cooling zone.

Preheated pellets are exposed to a temperature of 1200-1350°C which is the indurating temperature.

In the cooling zone, the pellets are cooled to a temperature of 200°C approximately.

Indurating machine – Burners



For protecting the pallet cars from the high temperature of indurating furnace, hearth layer and side layer pellets are charged on pallets before green pellet charging.

The hearth layer and side layer pellets are nothing but bigger size fired pellets taken from product. These pellets are segregated by natural gravity segregation or by a vibrating screen.

Design features:

In order to have the maximum thermal efficiency, most effective process gas ducting is designed.

Process gas fans with variable speed control to optimise the power consumption & modulating dampers in the duct line for effective process gas flow and furnace temperature control are used for producing good quality pellets.

Reduced heat energy consumption due to direct transfer of heat from cooling zones to firing zones

Efficient fuel burners are used for furnace heating and to optimise fuel consumption.

Robust furnace seals are used to minimize the air leakage & to reduce power consumption.

Process gas fans are designed with variable frequently drives in order to optimise the Power-consumption.

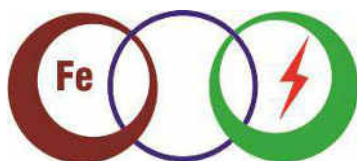
Effective automation systems & logics are used for effective process control & quick process corrections thereby minimizing the plant downtime.

Pallet cars are manufactured out of high temperature resistant alloy steel casting.

Efficient pallet car changing unit for pallet replacement helps reduce manual labour and reduce the pallet change over duration.

References.

- 1) Complete basic & detail engineering, project management, supervision of erection, commissioning and performance guarantee tests for 0.6 MTPA straight travelling grate pelletizing plant (URALMASH SUPPLY) at MINERA STEEL & POWER Pvt Ltd Bellary, Karnataka in the year 2014. PG test was conducted in this plant successfully, to establish the product quality parameters. All the PG test parameter values have surpassed our expectations.
- 2) Pre Commissioning, commissioning and stabilization of 1.2 MTPA straight grate Pelletizing plant at OMML (Adhunik group), Kandra, Jharkhand in the year 2010 -2011.
- 3) Pre Commissioning, commissioning and stabilization and product quality improvement of 4.5MTPA straight grate Pelletizing plant (AKER SUPPLY) at Jindal Steel&Power Ltd, Barbil, Orissa in the year 2009-2010.
- 4) Post commissioning, plant stabilization study & report of 6 MTPA straight grate Pelletizing plant (OUTOTEC SUPPLY) at TATA STEELS Jamshedpur.
- 5) Product quality improvement & plant stabilization for 1.2 MTPA rotary klin pellet plant (MEPC) at M/s Arya Iron and Steel Ltd Barbil, Orissa.
- 6) Product quality improvement for 3.5 MTPA straight grate Pelletizing plant (LURGI GERMANY SUPPLY) for M/s ESSAR Vizag Pellet plant, Vizag, AP.
- 7) Product quality improvement & plant stabilization Iron Ore Beneficiation and Pelletising Plant, M/s JSL, Bhilwara, Rajasthan.



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