CHAPTER 4

PROFILE OF INDUSTRIES AND COMPANIES
## CHAPTER CONTENTS

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4.1 INTRODUCTION

This chapter enlightens briefly the importance of selected industries namely Cement and Steel industry in India and also gives a crisp report about the status of these industries in the present day with a gist of road ahead to these in nationwide scenario. Also, the chapter gives a brief profile of the organisations in which the study has been conducted that is Penna Cement Industries Limited and Gerdau Steel mentioning the salient features of the companies and the employee welfare measures provided by the company.

The **Cement industry** is one of the major and oldest established manufacturing industries in the modern sector of the Indian economy. It is an indigenous industry in which the country is well-endowed with all the necessary raw materials, skilled manpower, machinery, equipment and technology. It is one of the key, capital-intensive, energy and transport-intensive industries in India. It is both a basic and consumer industry. It produces a commodity that enters into various construction, investment and welfare activities in almost every segment of an economy. It’s product is required by firms, factories and households and for construction of dams, highways and bridges etc. Its contribution to the development of modern civilization is evident by the innumerable ways in which its product is being used from massive dams and towering sky-scrapers to dainty gardens, walks and shimmering fountains. It is thus a vital industry which assumes a crucial part in the economic growth and development of country. Thus it is regarded as a major nation building industry, whose importance in a developing economy can never be over-emphasized. The Role of Cement Industry in India’s GDP is significant in the economic development of the country. The cement industry in India is one of the oldest sectors in India. The industry is driven by the immense growth in the housing sector, the infrastructure development, and construction of transportation systems.\textsuperscript{155}

The **Steel industry** is one of the most important industries in India. During 2014 through 2015, India was the third largest producer of raw steel and the largest producer of sponge iron in the world. The industry produced 91.46 million tons of total finished steel and 9.7 million tons of pig iron. Most iron and steel in India is
produced from iron ore. The Indian Ministry of Steel is concerned with the coordination and planning of the growth and development of the iron and steel industry in the country, both in the public and private sectors; formulation of policies with respect to production, pricing, distribution, import and export of iron and steel, Ferro alloys and refractories; and the development of input industries relating to iron ore, manganese ore, chrome ore and refractories etc., required mainly by the steel industry. Most of the public sector undertakings market their steel through the Steel Authority of India (SAIL).156

4.2 INDUSTRY PROFILE – CEMENT

4.2.1 GLOBAL AND NATIONAL SCENARIO
Globally, India is at 2nd largest position157 in terms of both production as well as consumption of Cement. Cement Industry in India thrives due to the high level of activity going on in private real estate sectors as well as high government spending is allocated for building of smart cities and urban infrastructure. Almost 575 nos. of operational cement plants are running in the country which makes the Cement production capacity of the nation to 420 million tonnes as of July 2017157 which is forecasted to reach 550 million tonnes by the year 2025. With such humongous cement production capacity, India is expected to retain the position of being the second largest cement producer in the world for years to come and may further rise to be the Global leader. Of the total capacity, 98% of the units are with the private sector and the rest are with the public sector. Out of these, the top 20 companies accounts for around 70% of the total production capacity. Also one more important observation is that almost 350 million tonnes of the total cement production capacities are taken care by 210 large cement plants cumulatively whereas over 350 mini cement plants have an estimated production capacity of nearly 11.10 million tonnes, as of 2016. Of the total 210 large cement plants in India, 77 are situated in the states of Andhra Pradesh, Rajasthan and Tamil Nadu.158
The Chart no. 4.2.1 below indicates the top cement producing countries in the world in the financial year 2016\textsuperscript{159}.

\textbf{Source: International Cement Review}

\textit{Chart 4.2.1 Top Cement Producers in FY16 (in million tonnes)}
4.2.2 ADVANTAGE FOR CEMENT INDUSTRY SECTOR IN INDIA

Following are the advantages for the Cement Industry sector in India.

Robust Demand

Increased allocation to infrastructure projects in Union Budget 2017-18 to drive demand and the Initiative to build 100 smart cities and boost to affordable housing projects to give a further stimulus.

Long-term Potential

Oligopoly market where large players have partial pricing control and low threat from substitutes.

Increasing Investments

Robust investments are being made by the existing players to expand their capacity. Private sector investments and foreign investments in the sector are on the rise. FDI inflow in Cement and Gypsum products manufacturing industry reached US$ 5.24 billion between April 2000 and March 2017.

Attractive Opportunities

The North-East, which is witnessing a construction boom, offers attractive investment opportunities. The State Government of Chattisgarh has auctioned one block of Limestone (Kesla II) in Raipur District having estimated reserves of 215 million tonnes which would earn revenue of US$ 1.85 billion over the lease period.

4.2.3 MARKET OVERVIEW AND TRENDS

In FY16, India produced 283.50 million tonnes (MT) of cement and stood as the second highest producer of cement in the world. India’s cement production is more than three times the production of the USA, which stands third for the production of cement in the world. Supported by high level of activity going on in real estate and high government spending on smart cities and urban infrastructure, the Industry is
expected to grow at 5-6% CAGR between FY17 – FY20. Capacity addition of 109 million tonnes per annum (mtpa) happened between the years 2013 and 2016. Total installed capacity of 420 million tonnes as of June 2017. It is estimated that the domestic consumption to outpace supply in next three fiscals.\textsuperscript{161}

Fig. No. 4.2.3.1 shows the installed capacity and key markets in each of the geographic regions in \textit{INDIA}.\textsuperscript{162}

\begin{center}
\includegraphics[width=\textwidth]{Fig. No. 4.2.3.1 Installed Capacity and key markets in each of the geographic regions}
\end{center}

\textit{Notes: mtpa - Million Tonnes Per Annum, E- Estimates}
4.2.4 PORTER’S FIVE FORCE FRAMEWORK ANALYSIS FOR THE CEMENT INDUSTRY IN INDIA

Following are the five force framework analysis for the cement industry in India –

**Threat of Substitutes**
There is a Low Threat of Substitutes for the Cement Industry in INDIA. Although there are partial substitutes such as asphalt, glass, steel, wood, etc.; practically cement has no direct substitutes.

**Bargaining Power of Suppliers**
There is a moderate Bargaining Power of Suppliers in Indian Cement Industry. Cement players have to depend on the railways for carriage outward and local coal companies for fuel, although diversification of freight options and fuel sources is diminishing the suppliers’ power.

**Competitive Rivalry**
There is a Low Competitive Rivalry in the Cement Industry in INDIA. The Indian cement market is oligopolistic in nature, characterised by tacit collusion, where more than the government, the large players in the sector partially control supply for better price discipline.

**Bargaining Power of Buyers**
There is a Low Bargaining Power of Buyers in Indian Cement Industry. Substantial market concentration among large players ensures low bargaining power of buyers.

**Threat of New Entrants**
There is a Low Threat of New Entrants in the Cement Industry in INDIA. Huge capital investments required. Present substantial barriers to entry and achieving economies of scale also discourage the new entrants to the industry.
4.2.5 RECENT TRENDS IN CEMENT INDUSTRY IN INDIA

Following are the recent trends in Cement industry in India

**Increasing presence of cement players**

Presence of small and mid-size cement players across regions is increasing, which helps to diminish market concentration of industry leaders. A large number of foreign players have also entered the market owing to the profit margins, constant demand and right valuation.

**Tie-up with overseas**

India has joined hands with Switzerland to reduce energy consumption and develop newer methods in the country for more efficient cement production, which would help India meet its rising demand for cement in the infrastructure sector.

**Housing for All**

Under Union Budget 2017-18, US$ 3.42 billion has been allocated to achieve government's mission of 'Housing for All by 2022. Housing sector accounts for nearly 67% of the total cement consumption in India.

**Adoption of cement instead of Bitumen and Ready Mix Concrete (RMC)**

The Government of India has decided to adopt cement instead of bitumen for the construction of all new road projects on the grounds that cement is more durable and cheaper to maintain than bitumen in the long run. Companies are trying to develop a niche market for RMC (Ready Mix Concrete).

**Mergers and Acquisitions**

4.2.6 RECENT STRATEGIES ADOPTED BY COMPANIES IN CEMENT INDUSTRY SECTOR IN INDIA

Fig. No. 4.2.6.1 shows the recent strategies adopted by companies in Cement industry Sector in India by the predominant players in the industry.

<table>
<thead>
<tr>
<th>Company / Plant</th>
<th>Strategy</th>
<th>Benefits</th>
</tr>
</thead>
<tbody>
<tr>
<td>Madras Cement’s Audhistor plant</td>
<td>Module Use bioenergy through burning of coffee husk and cashew nutshell</td>
<td>Annual cost savings of US$ 1.7 million</td>
</tr>
<tr>
<td>India Cements Ltd’s Delava plant</td>
<td>Use Low Sulphur Heavy Stock (LSHS) sludge as alternate fuel</td>
<td>Annual savings of US$ 6.500</td>
</tr>
<tr>
<td>UltraTech’s Gujarat Cement Works</td>
<td>Use tyre chips and rubber dust as alternate fuel</td>
<td>Reduction of about 30,000 tonnes of carbon emissions annually</td>
</tr>
<tr>
<td>Lafarge’s Armasta plant</td>
<td>Substitute 10 per cent of coal used in kilns with rice husk</td>
<td>Higher energy savings and lower carbon emissions</td>
</tr>
</tbody>
</table>

Source: CEMENT MANUFACTURERS’ ASSOCIATION

Fig. No. 4.2.6.1 – Recent strategies adopted by companies in Cement industry Sector in India

4.2.7 GROWTH DRIVERS AND OPPORTUNITIES

Following are considered to be the Growth Drivers and Opportunities in the Cement Industry sector in INDIA –

**Housing**

This forms the major portion of cement demand at around 70%. Real estate market is expected to increase at 11.6% CAGR in 2011-20. Government initiatives like Housing for all to push demand in the sector.
Infrastructure

Strong focus of is being given by government. 100 smart cities planned. Projects like Dedicated Freight Corridors and ports under development. Metro rail projects already underway in most major cities.

Urbanisation

Development of 500 cities with population of more than 100,000 under new Urban Development Mission is on.

4.2.8 INVESTMENT SCENARIO

Following section briefly discuss the investment scenario existing at the moment in Cement industry sector in India. FDI inflow in industry related to manufacturing of Cement and Gypsum products reached US$ 5.24 billion between April 2000 and March 2017.

Emami Cement

The company has declared to set up a cement grinding plant in West Bengal and is also planning to build 2 other units in Andhra Pradesh and Rajasthan. The company plans to increase its capacity from existing 2.4 MT to 15-20 MT by 2021, with an investment of US$ billion.

Shree Cement

In 2016, Shree Cement announced to spend around US$ 0.9 billion to establish 3 new clinker plants. With the expansion, the production capacity of the company would increase from 23.6 mtpa to 33.6 mtpa.

Ambuja Cement

Ambuja Cements is targeting an investment of US$ 580 million for capacity expansion in Rajasthan, Madhya Pradesh and Uttar Pradesh. The proposed project in Rajasthan is expected to add 5 MT to Ambuja Cements’ existing production capacity of mtpa.
Dalmia Cement

Dalmia Cement is planning an investment of US$ 333.3 million to ramp up its manufacturing capacity to 21 mtpa from the existing 17 mtpa over the next 2 years and has started operations at its new Greenfield unit in Karnataka. The subsidiary of Holcim has plans for a US$ 500 million capacity expansion in India ACC has upgraded and expanded its Jamul unit in Chattisgarh and its grinding unit in Jharkhand. This has increased ACC’s capacity to 33.41 mtpa from 30 mtpa in a phased manner and is expected to reach 55 mtpa by 2020

Heidelberg Cement

Heidelberg Cement, a Germany-based cement manufacturer has commissioned Phase-I of its Jhansi grinding unit. The company has undertaken an investment worth US$ 259.4 million for expanding its capacity to 2.9 MT. Heidelberg aims to ramp up the operational capacity to 6 MT at its Damoh plant in Madhya Pradesh, striving to add an additional 9 MT by 2017.

UltraTech Cement

UltraTech has planned to construct 2 Greenfield grinding units in West Bengal and Bihar.

Amrit Cement

Amrit Cement India Ltd (ACIL) has announced the launch of Amrit Cement in the North-Eastern market. The company plans for capacity expansion in North-Eastern Bihar and Nepal

4.2.9 POLICIES AND INITIATIVES

Union Budget 2017-18

The Union Budget proposed to assign infrastructure status to affordable housing projects and facilitate higher investments and better credit facilities, in line with the government’s aim to provide housing for all by 2022 which will boost cement demand.


**Housing Loans**

The National Housing Bank will refinance individual housing loans of about Rs 20,000 crore (US$ 3 billion) in 2017-18. The Finance Minister proposed to complete 10 million houses by 2019. All these developments are expected to boost cement demand.

**Pradhan Mantri Awaas Yojana – Gramin scheme**

The increased allocation to rural low-cost housing under Pradhan Mantri Awaas Yojana- Gramin scheme to Rs. 23,000 crore (US$ 3.45 billion) from Rs. 16,000 crore (US$ 2.4 billion) in FY17 is likely to drive a 2% increase in cement demand.

**Auction of one block of Limestone (Kesla II)**

The State Government of Chattisgarh has auctioned one block of Limestone (Kesla II) in Raipur District having estimated reserves of 215 million tonnes valued at Rs 10,367 crore (US$ 1.62 billion), and would earn a cumulative revenue of Rs 11,894 crore (US$ 1.85 billion) to State Government over the lease period.

**4.3 INDUSTRY PROFILE – STEEL**

**4.3.1 GLOBAL AND NATIONAL SCENARIO**

The global production of crude steel has reached 1630 MT (million tonnes) in the year 2016. Compared to 2015, a 0.6% of growth has been witnessed. India stood at No.4 position with a production of 96 MT of crude steel in 2016. China continued to remain as world’s largest crude steel producer in 2016 with a production of whopping 808 MT. It is followed by Japan who produced 105 MT of crude steel in 2016. It is projected by World Steel Association that Indian steel demand would grow by 6.1% in 2017 and subsequently by 7.1% in 2018. In global scenario, it has been projected that the steel demand would grow by 1.3% in 2017 and it would increase by 0.9% in 2018. Moreover, the Chinese steel usage is projected to indicate negligible growth in
2017 and it may further decline by 2% in 2018. Per capita finished steel consumption in 2016 is placed at 208 kg for world and 493 kg for China by World Steel Association.

Post de-regulation, the Steel industry in INDIA has moved into a novel development stage. It is presently riding tall on the reviving economy which is witnessing and increasing demand for steel. Rapid increase in steel production has led a way to India to become the 3rd largest crude steel producer in 2015 and also in 2016. During the period 2003-2015, India has been the largest manufacturer of sponge iron or DRI in the world but it has fallen to 2nd position in manufacturing of sponge iron or DRI in the world in 2016 (1st position being occupied by Iran). When it comes to assessing the finished steel consumption in the world, India has been holding the 3rd position and has maintained this position in 2016. The above information regarding positioning at global levels are given based on provisional data issued period wise by the World Steel Association.

In a presently de-regulated and liberalized economic/market scenario that is prevailing in our country, the Government is playing a role of being a facilitator to lay down the policy guidelines and to establish the institutional structure and mechanism for giving a conducive operating environment thereby improving efficiency and the performance of the nation’s steel sector. Accordingly, the Government of India has come up with the National Steel Policy 2017, which has given down the wider roadmap with envisioning long term growth for the steel industry in India at both on supply side as well as the demand side by 2030-31. The mentioned Policy is an updated form of National Steel Policy 2005 which was released in the year 2005 to provide a road map for long-term growth perspective by 2019-20 for the nation’s iron and steel industry.

The Government of India’s Ministry of Steel has further announced a policy for giving priority to domestically manufactured Steel & Iron products for procurement for government bodies’ necessities. This policy pursues to achieve the Prime Minister Shri Narendra Modi’s vision of ‘Make in India’ with nation building objective by way of encouraging domestic manufacturing. This policy has been declared to be made
applicable on all the government tenders where bid for the price has not yet been
opened. Further, the Policy gives a guaranteed value addition of 15% in products of
the steel that are notified to be covered under preferential procurement by the
government of India. In order to give greater flexibility, the Ministry of Steel of the
Government of India may opt to review specified steel products and the minimum
value addition criterion. 169

PRODUCTION

Steel industry has been freed up from various complex licensing regulations and has
been made liberal in the years 1991~1992. Thereafter, the steel production in India
has sharply gone up and India secured 3rd position in the Crude Steel production
globally. As per provisional data available for the year 2016-17, production for the
sake of sale of total finished steel including alloy category as well as non-alloy
category has been 100.74 MT which is a 10.7% growth over 2015-16’s production of
Crude steel in India. As per provisional data available for the year 2016-17,
production for the sake of sale of Pig Iron 9.39 MT which is a 1.8% growth over
2015-16’s production of Crude steel in India. During the years between 2003 and
2015, India has been in the leading position in terms of production of sponge iron in
the world. In the year 2016, Iran had taken over India in the production of sponge
iron. Data on production / production for sale of pig iron, sponge iron and total
finished steel (alloy/stainless + non-alloy) are given below for last five years and
April-May 2017. 170
DEMAND – AVAILABILITY

The Demand – Availability dynamics of Steel Industry including availability of iron and steel in the country are majorly ascertained by market forces. The gaps in demand-availability are often met through imports. Interface with the consumers prevails by convening of the Steel Consumers’ Council that is being conducted on regular basis. These regular interfaces take care to redress the problems existing in the Availability arena of the Steel and Iron and also redress the complaints related to the quality.

STEEL PRICES

Price of the Iron & Steel has been deregulated and abolished in the year 1992. Since then, the price of the iron and steel are ascertained by the interplay of various market forces. Domestic steel prices are majorly influenced by the way the prices of the raw material prices tend to change, its demand and supply conditions in the market scene and also partly depends on the international price trends among others. Under the Chairmanship of Secretary (Steel), the Ministry of Steel of the Government of India has also kept Inter-Ministerial Group (IMG) under functioning to coordinate and monitor the major investments in the country in its Steel industry.
The Government by playing a role of a facilitator monitors the market conditions of the Steel, makes assessment of its conditions and decides on fiscal policy and other policy based on the same. As per new GST (Goods & Services Tax) norms released in July 2017, a GST of 18% is being made applicable on Steel. However export duty is not being applied on Steel products. However, other than low grade (below Fe 58%) iron ore lump & fines and iron ore pellets which doesn’t have any export duty, the government has applied a 30% export duty on all other forms of iron ore.

In view of increasing imports, the Government of India had also earlier increased twice the import duty on many of the steel items, each time by 2.5%. The government had also applied a plethora of measures which includes anti-dumping measure and safeguarding duties on a big list of applicable steel and iron items. Further to above, the government of India in order to discourage import of steel barred the manufacturing and sale of steel products which does not comply with standards laid by Bureau of Indian Standard (BIS). Moreover, to keep a check on the sale and supply of the sub-standard stainless steel products which is used for production of kitchen utensils and various other appliances, the Government of India came up with the Stainless Steel (Quality Control) Order, 2016 for those products that are being used in manufacturing of kitchen utensils and appliances, which would also help in curbing the imports of the Steel and Iron.

**IMPORTS**

As per the presently in effect Extant Policy, Steel & Iron are freely importable. Data in the below table represent the import of total finished steel including alloy, stainless as well as non-alloy for last five year period is indicated in Tab. No. 4.3.1.2
Tab. No. 4.3.1.2
Indian steel industry - Imports Data

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<tbody>
<tr>
<td>Total Finished Steel (alloy/stainless + non alloy)</td>
<td>7.93</td>
<td>5.45</td>
<td>9.32</td>
<td>11.71</td>
<td>7.23</td>
<td>1.06</td>
</tr>
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</table>

Source: Joint Plant Committee; * Provisional Data only.

EXPORTS

Steel & Iron products are freely exportable from India. Data in the below table represent the export of total finished steel including alloy, stainless as well as non-alloy for last five year period is indicated in Tab. No. 4.3.1.3.

Tab. No. 4.3.1.3
Indian steel industry – Exports Data

<table>
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</tr>
</thead>
<tbody>
<tr>
<td>Total Finished Steel (alloy/stainless + non alloy)</td>
<td>5.37</td>
<td>5.99</td>
<td>5.59</td>
<td>4.08</td>
<td>8.24</td>
<td>1.38</td>
</tr>
</tbody>
</table>

Source: Joint Plant Committee; * Provisional Data only.

4.3.2 STEEL AND IRON IN PRIVATE SECTOR - OPPORTUNITIES FOR GROWTH

The New Industrial Policy Regime

On the onset of the New Industrial policy, by the way of removing the Iron and Steel industry from the list of industries which are kept reserved for public sector and also exempting the Iron and steel industry from compulsory licensing, the Indian iron and steel industry got opened for private investment. Moreover, in the present scenario,
the import of foreign technology along with the foreign direct investment is being freely permitted up to certain maximum limits. In this kind of liberalized scenario, the Government of India’s Steel Ministry plays the role of a facilitator thereby providing broader directions and necessary guidance to existing steel plants and also for the new plants that have recently come up or those that are coming up.

**The Growth Profile**

The liberalization of the industrial policy for the Iron and Steel industry along with other Government of India's initiatives have given a definite motivation for entry, participation as well as growth of the private sector in the steel industry. While the presently running units are being modernized and or expanded, a huge number of new steel plants have also been set up in various parts of the nation which are equipped with modern state-of-the-art technologies which are also cost effective. Moreover, during this last few years, the demand side has also experienced a rapid and stable growth which has prompted a lot of domestic entrepreneurs to come up with fresh greenfield projects in various states of the nation.

Crude steel capacity has been 126.33 MT in 2016-17 as per the available provisions data which is up by 3.6% over 2015-16. India has emerged as the 3rd largest manufacturer of crude steel globally in 2016 as per provisional ranking announced by the World Steel Association. To its credit, our nation has the capability to manufacture a range of grades when it comes to Steel and Iron and that too, of international quality standards. India is expected to surpass Japan and become the 2nd largest producer of crude steel in the world in coming years.

**NATIONAL STEEL POLICY 2017**

Steel is a product of varied and technologically complex industry which has a strong linkages in both forward and backward directions in terms of flow of materials and income generation. Steel is also one of the most prime products of the present day world. Steel has a strategic importance in the development of any nation which is predominantly industrial. Steel finds its way into a large variety of applications
ranging from the construction, industrial machinery to the day to day consumer products. Further, steel industry employs diverse technologies based on the nature of raw materials used. India’s rapid Industrial Development has been based on a vibrant Steel industry which has historically been its foundation. When the production of Steel is considered, India has grown from a small production capacity of 22 MT in FY 1991-92 which was prior to deregulation, India has grown to become the 3rd largest steel producer in the world with a production of 91 MT in FY 2015-16. The National Steel Policy 2017 (NSP 2017) is an initiative by the Indian Government to effectively steer the industry thereby making it achieve its full potential and to enhance steel production with focus on high end value added steel while remaining to be globally competitive. The National Steel Policy 2005 (NSP 2005) had aimed to indicate ways to combine the gains flowing out from the economic order prevailed at that time and gave out a road map for sustained growth of the Indian steel industry. However, due to the presently unfolded changes in both on the demand and supply sides of the steel market in India and also globally, it is sensed to have warranted a review at the various elements of the NSP 2005 which has given way to NSP 2017. Our nation’s biggest advantage in production of steel is influenced to a large extent, from the native availability of both the high grade iron ore and also the non-coking coal which is the two chief raw materials required for production of steel. Further to the abundant availability of above mentioned two ingredients, our nation also has a huge and quickly growing market for steel. Further to these, a strong MSME sector along with a relatively young work force with competitive labour costs adds up to the advantage to the country in terms of Steel production.

Influenced by the positive demand outlook and also due to the prevailing high prices of steel in the period post 2004, the Indian steel sector had obtained a plethora of investments in the states of Odisha, Jharkhand, Karnataka and Chhattisgarh. Subsequently, a large number of newer plants were created and also the existing plants were modernized. A significant portion of these investments have been funded by the banks and other forms of public borrowings.
India has a significant potential for growth in the production of Steel with its low per capita steel consumption standing at 61 Kg, as compared to global average of 208 Kg. Moreover, under the leadership of honorable Prime Minister Shri Narendra Modi ji, our nation’s economy is swiftly growing with huge focus on infrastructure and construction sector. There have been various initiatives being taken up by Government of India viz. providing affordable housing to the citizens, expansion of the railway networks to different parts of the nation which are yet to be brought under the railway corridor, focus on the development of shipbuilding industry, easing up of defense sector thereby opening it for private participation, the anticipated growth in the automobile sector are all anticipated to generate predominant demand for steel in the nation. Moreover, while the prime focus of the industry is set on the domestic market as of now, being in a strategic location connecting the developed west part of the world and the developing eastern part of the globe, our country foretells well for the industry expecting opportunities for exports of finished goods as well as imports of some scarcely available raw materials.

The Indian steel industry can be categorized in to three categories based on type of Furnace used for production viz. BF-BOF (Blast Furnace – Blast Oxygen Furnace), EAF (Electric Arc Furnace) and IF (Induction Furnace). BF-BOF type producers have huge integrated steel manufacturing facilities which chiefly utilize iron ore and coking coal for steel production. Presently, the BF-BOF route has a combined capacity of about 50 MT at an utilization levels of 82%.

Unlike as existing in the other large steel producers in the global level, the steel industry in India can be characterized by the existence of a many number of small steel producers who use sponge iron, melting scrap and non-coking coal by using the EAF or IF type of furnaces for making of steel.
Since 1992, during the past two decades, the steel industry of India has developed capacities to produce a wide range of urbane steel to the standards equal with global best practices by addressing the variety of needs of the end user industries. Nevertheless, India needs to still make an effort to domestically produce steel for high end applications, electrical steel (CRGO), special steel and alloys for Power equipment, Aerospace, Defense and Nuclear applications.

The current context and the long term perspectives on growth

For the Indian steel industry, a key trait has been the domestic demand which has an influence of the growth of the Indian economy. The decade before the year 1991
during when liberalization of the Indian steel industry had taken place, our nation witnessed growth in crude steel production at a CAGR of 5.2%. Post liberalization, witnessed a decadal CAGR of 6.1% which increased further to 8.3% during 2000-01 to 2015-16.

However, today the Indian steel industry is exposed to many challenges external to our nation that is linked to slow global economic growth and global idle steel capacity. With meek economic prospects prevailing across the globe, the Indian steel industry has fallen in a situation to mainly depend on the requirement of within country’s consumption for its future.

Fig. No. 4.3.2.2 indicates the Industry Analysis of the Steel industry sector in India

![Fig. No. 4.3.2.2 Indian Steel sector – Industry Analysis](image-url)
4.4 COMPANY PROFILE – PENNA CEMENT INDUSTRIES LIMITED

The following data regarding Penna Cement Industries Limited and its Cement plant in Tadipatri mandal has been collected from Secondary Data Sources viz. its website www.pennacement.com and from the various publications and notices issued by the organisation.

4.4.1 INTRODUCTION

The month of August 1994 saw the commissioning of the Penna Cement Industries Limited at Talaricheruvu Village in the Tadipatri Mandal of Ananthapuramu District, in close proximity to the cities of Chennai and Bangalore, particularly to the states of Tamil Nadu, Karnataka and Kerala. Country’s one of the richest Limestone reserves make the Tadipatri belt a preferred site for setting up Cement Industries. As a result, the Penna Cement Industries Limited has access to some of the finest quality limestone available in the country thereby the plant is able to produce one of the finest quality cement in the country. The plant has expanded to 1.7 Million Tons per annum to cater the growing demand by installing Vertical Roller Mill supplied by M/s. Ube, Japan for grinding slag and clinker separately.

Other than the plants located at Tadipatri Mandal, the Penna Cement Industries Limited have also established 1 Million Ton plant at Ganeshpahad Village, Damarcherla Mandal of Nalgonda District to cater the coastal and Telangana Regions of Andhra Pradesh, and the states of Orissa, Tamil Nadu and Chhattisgarh. The plant also has close proximity to ports of Kakinada and Visakhapatnam for export of cement. The Ganeshpahad plant is incorporated with latest Hi-tech dry process technology with rotary kiln and a latest six stage pre-heater Technology with low pressure drop cyclones and a pre-calcinatory of the latest design provided by M/S. Onoda, Japan the world leaders in cement production technology and promotes superior heat recovery and increased calcinations. Two Eight spout 120 TP rotary electronic packers ensure that each bag contains the correct weight, Thus consistency, homogeneity and uniformity of the products is assured.
4.4.2 ORIGIN & GROWTH OF THE PENNA CEMENT INDUSTRIES LTD

In the year 1992, Sri. P. Pratap Reddy with the help of some associates of Mantapam village of Ontimitta Mandal of Kadapa district commenced the establishment of the PENNA CEMENT INDUSTRIES LTD at Talaricheruvu Village. The production started in the year 1994 with 600 tons capacity per day. At present, the capacity has been increased 5-folds and it is 3000 tons per day. The profits for the year 2008-2009 were INR10 Crores and sales of INR 96.472 Crores. The Penna Cement Industries Limited holds the assets worth INR 60.2 Crores.

4.4.3 EMPLOYEE WELFARE MEASURES PROVIDED IN PENNA CEMENT

It can be undoubtedly stated that the company is providing numerous measures both statutory and non-statutory. Here is the gist of welfare measures provided by the company.

Canteen

Full-fledged round the clock canteen facilities are provided in plant and mines for employees on duty. These provide food at subsidized rates.

Medical Centre

A full-fledged Medical Centre with two bed facility is situated in Township for the benefit of employees and their dependent family members and the treatment & medicine are provided free of cost. The services are rendered by two Medical Officers. Apart from Medical Centre one Ambulance each is provided at the Plant and Mines for meeting emergency medical assistance of the employees.

Conveyance

Conveyance facility on the Talaricheruvu – Tadipatri route is provided for the employees for to and fro journey to attend duty. Free conveyance is also provided to school/ college going children of employees from township to Tadipatri.
**Compassionate Employment Scheme**
This scheme provides employment in the company to the dependent of the employees who die while in service.

**Accommodation**
Family and bachelor accommodation is provided for the company employees.

**Employees Cooperative Society**
An Employees Co-operative Society is functioning in Township with ample assistance from the Company. The Society is providing provisions, stationary items etc. to the employees on credit, which will be deducted from their salary.

**Employees Recreation Club**
A recreation club is working to boost the creative talents of employees and their children in the field of arts and sports.

**Community Hall**
A community hall with a seating capacity of more than 300 is constructed in the Premises. The community hall is used as Indoor Stadium also for games like Badminton, Table Tennis, Carroms etc.

**4.4.4 FEATURES ABOUT PENNA CEMENT INDUSTRIES**

**Location**
The PENNA CEMENT INDUSTRIES LIMITED is located at TALARICHERUVU village limits of Uritchintala at a distance of about 12km from TADIPATRI town. The factory is located at a height of 287 m above the sea level.

**Finance**
In Penna Cement Industries Limited at Talaricheruvu village, the Capital funds has been drawn from different sources viz., an Equity share capital of INR19.4 Crore and a loan of INR 29.4 Crore and state investment subsidy of INR 20 lakh and the total
Total Quality Control
There is a Central Control Room that is equipped with a Main Frame Computer which effectively controls all the associated activities in the plant. Beginning from the Mining of the limestone which is one of the basic raw materials to the final packaging of the end products, thorough vigorous checks are conducted at every stage to ensure that the highest quality control is affected and the end product is of finest quality.

Technology
Cement grinding in VRM is the latest technology in cement manufacturing. To compete in par with the latest developments in the cement production technology, these Vertical Roller Mills (VRM) has been imported from industrial town of Ube in Japan and the same has been installed for the combined operation of Drying and Grinding. Cement produced through the VRM has an optimum particle size distribution resulting in superior quality. One other salient feature of the Penna Cement Industries Limited at Talaricheruvu village is the use of the separate Grinding and Blending of Clinker and Slag which provides adequate flexibility in operations and also gives way to obtain the customized product specifications.

The mixing of the ground Clinker Slag is done in the “Twin Shaft Blender”, with latest technology. While coming to the packaging section, in order to ensure that each packed bag contains the exact specified quantity of finished product, the latest generations packers supplied in collaboration with Haver and Boecker of Germany, have been installed. To cater for large demands, bulk loading facility is also been made available.

Industrial Environment
A harmonious industrial relations are being maintained in the Penna Cement Industries Limited at Talaricheruvu village. There is 1 no. union exist in the Penna Cement Industries Limited at Talaricheruvu village by the name “Penna Cement
Industries Employees Union” which plays an effective role in addressing the concerns of the employees and effectively communicating to the management and finding amicable solutions. The plant doesn’t witness any strikes and lockouts.

**Government Policies**
To chiefly uphold industrial atmosphere in the Rayalaseema belt particularly in the district of Ananthapuramu and also to effectively utilize the abundantly available finest Limestone reserves of the country, the Government provided license to begin the Penna Cement Industries Limited. The government also sanctioned Mining lease for 235 acres of land in Talaricheruvu village and 440 acres of land in Urichintala village of limestone mining to enable the factory to produce its primary raw material.

**Payments of Taxes and Other fees to the Government**
The Penna Cement Industries Limited is paying INR 44 lakh per month as royalty for Mining, INR 2.80 Crore per month as Central Excise Tax, INR50 lakh per month as Sales Tax and INR8000 per month as Professional Tax to respective departments of the Government. The mentioned amounts are subjective and may vary largely depending on the existing valid rules and regulations from time to time.

**Corporate Social Responsibilities Activities**
The Penna Cement Industries Limited maintains a Hospital and an English medium school nearby premises. In addition to the employees of the organization, the villagers of Urichintala and Talaricheruvu villages are also treated at the hospital free of cost. In addition to the children of the employees of the organization, the children of the villagers of Urichintala and Talaricheruvu villages are also allowed to study in the Primary School on free education system.

**Departments**
The departments at Penna Cement Industries Limited at Talaricheruvu village are
1. Production department
2. Marketing department
3. Finance department
4. Human Resource department
5. Quality Maintenance department
6. Research & Development department
7. Information Systems department
8. Purchase department
9. Sales department
10. Quality control department

**Products manufactured at Penna Cement Industries Limited at Tadipatri**

Following are the final products that are manufactured in the Penna Cement Industries Limited at Talaricheruvu village -

1. Penna Cement
2. Penna Power
3. Penna Super
4. Penna Suraksha

**Analyzing Market Opportunities**

The Penna Cement Industries Limited company analyses the market opportunities with the help of some tools and techniques, those are given below.

1. Gathering of information and measuring market demand.
2. Scanning the market environment.
3. Analyzing consumer markets and buyers behavior.
4. Dealing with the competition.
5. Identifying market segments and selecting target markets.

**Developing Marketing Strategies**

The Penna Cement Industries Limited Company develops marketing strategies after carefully analyzing the market opportunities using various techniques as stated above and develop different Marketing Strategies to ensure the products manufactured is in line with the market demands and hence company is making profits.
Following Market strategies can be taken as samples of various strategies followed by the company

1. Positioning the market offering through the product life cycles.
2. Developing new market offering.
3. Designing global market offering.

Making Marketing Decisions
After the strong market strategies are developed and presented to the Management, the Penna Cement Industries Limited Company makes the Marketing Decisions with the help of following tools

1. Managing product line and brands.
2. Designing and managing services.
3. Designing pricing strategies and programmes.

Managing and Delivering Marketing Programmes
The Penna Cement Industries Limited manage marketing channels by,

1. Developing marketing strategies
2. Making marketing decisions
3. Managing retailing, whole selling and market logistics
4. Managing advertising, sales promotion and public relation
5. Managing the sales force
6. Managing direct and on-line marketing
7. Managing the total marketing programs
8. Managing and delivering marketing programs

4.4.5 OPERATIONAL PERFORMANCE
The Penna Cement Industries Limited Company maintains adequate equipment and in good working conditions to ensure sufficient production in line with the Marketing Decisions made. The operational performance is the essential element in the company.
**Raw materials**

Raw materials required for the Cement production should always be ready and the sufficient stocks of the same shall be maintained to ensure that there is no stop in production considering unexpected delays or breakdowns etc that can occur in the production or transportation of Raw materials.

The basic raw materials for the manufacturing of the cement at the Penna Cement Industries Limited are as follows

   a. Limestone  
   b. Iron ore  
   c. Bauxite  
   d. Gypsum  
   e. Blast Furnace Slag

**Machineries**

Machineries are all maintained in such a manner that there is no failure that occurs that stops the production processes. Depending on the type of machinery, the Periodical maintenance, Condition based maintenance, preventive maintenance are carried out well in advance.

**Man power**

The Manpower in the Penna Cement Industries Limited company can be broadly categorized as

   1) Managers  
   2) Officers  
   3) Supervisors  
   4) Staff  
   5) Technicians
4.4.6 PROCESSES IN THE PRODUCTION OF THE CEMENT

The two processes employed in the production of cement at Penna Cement Industries Limited are

1. Dry process
2. Wet process

**Dry Process**

The raw materials as stated above are first crushed into roughly 2-5 cm size pieces. These are then ground to become fine powder and the ingredients are stored in separate hoppers. The powdered materials are then mixed in the required proportions to get a dry “raw mix” which is stored in tanks and kept ready to be fed in the Rotary Kiln.

**Wet Process**

The raw materials as stated above are first crushed into roughly 2-5cm size pieces. These are then ground to become fine powder and the ingredients are stored in separate hoppers. There are then mixed with water in wash mills to remove any adhering organic matter etc. and form a Wet Clay. The so formed Wet Clay is then allowed to flow in a channel in the right proportions from where the two raw materials are led to grinding mills where they are mixed intimately to form a paste called “Slurry”. The Slurry is then led to a correcting basin where its composition may be adjusted as per requirement. This slurry is finally stored in storage tanks and kept ready for feeding in the Rotary Kiln. The burning process is then done in the Rotary Kiln.

**Production / Mining Process**

Mining process in the Penna Cement Industries Limited deals predominantly with Lime Stone Mining. Lime Stone deposit at Talaricheruvu is flat bedded and gently dipping and simple in nature. It is a non-burden soil. The mine is a Captive Mine that produces 90 thousand Metric Tons of Limestone per annum. The mining at Penna Cement Industries Limited is fully mechanized and it is operated with a Deep Hole
Drilling and Blasting. The mining area covers an area of 235.52 acres.

Following stages together constitutes Mining Process
1. Drilling
2. Blasting
3. Loading
4. Transportation

1. Drilling
Drilling is the operation which is carried out with 15mm diameter drill machines. The water used to dust separation during drilling operation is provided by the water tanker that is incorporated in the Drill Machines. The Drill machine is hence environmental friendly machine that imposes lesser threats to Operators and humans working around when compared to conventional drill machines. The hourly penetration rate is about 9m to 10m deep.

Blasting
Blasting is the operation which is done by using Conventional Cap Sensitive Explosive with Ammonium Nitrate Fuel Oil mixture. In the rainy season, the Ammonium Nitrate Fuel Oil is filled in polythene tubes and is used in watery holes. The Sequential Blasting machine is used to subside the vibrations in the ground and fly rock. Additionally, Non-Electric Shock tubes are used for blasting to further reduce the ground vibrations, fly rock and noise. The ratio of powder factor used in the mines is around 6.5 Metric Tons per Kilogram of explosive used.

Loading
Hydraulic Excavators are used to load the Lime stone into Dumpers. Water is sprayed on the blasting material to avoid dust generation during loading operation.

Transportation
Dumpers are used to transport the Limestone from Mines to the Crusher plant. A
gentle slops is maintained in the roads used for transportation of dumpers. Also, water is sprayed under the Dumpers movement on haulage road to avoid Dust generation.

**Process Description**

The process of production of cement in **PENNA CEMENT INDURSTRIES LTD** involves following operations.

1. Limestone Crushing
2. Stacking
3. Reclaiming
4. Raw Material Grinding
5. Storage & Homogenization of Raw Meal in continuous Blending silo
6. Coal Grinding
7. Clinkerisation (Pre Heater, Rotary Kiln, Cooling)
8. Cement Grinding & Storing
9. Cement Packaging & Dispatching

**Attendance**

Management instructs all employees to report for work in their respective workshops at least 15 minutes before the start of their shift. Prior attending to their duties, every employee has to report at TIME-OFFICE to mark their attendance.

**Breakfast / Lunch / Dinner / Tea**

Every day, breakfast shall be served at the Canteen at a subsidized rates between 07:30 Hrs to 07:55 Hrs for all the employees comprising 1st and General shifts. Every employee is allowed to take a break of 30 minutes during a shift for taking his lunch / dinner as per the shift timing taking care that the production activities are not affected.

Tea is served at the workplace once every shift. The timings are as follows –

1. 1st Shift & General Shift – between 09:15 Hrs and 09:45 hrs
2. 2nd Shift – between 16:30 Hrs and 17:00 Hrs
3. Night Shift – between 01:30 Hrs to 02:00 Hrs

During the above time, all the employees in the shift can have their tea taking care
that the production activities are not affected.

**Late Coming**

Punctuality is being followed very strictly in the organization and the management keeps a close track on the timings of the employees reporting to work. Management has put an upper limit of 15 minutes late attendance.

1. Late attendance not exceeding 15 minutes may be considered by the management to be acceptable on giving a satisfactory explanation in writing. That too, it should not be repeated more than 3 times.

2. Employees who are late by more than 15 minutes to attend to the work are liable to be shut out for the day. If an employee attends late by 15 minutes on 3 occasions shall be treated as half day absent.

**Permission Pass / Out Pass**

Permission Pass is the one which is taken whenever an employee going out of the industry for personal reasons while he is on duty. He has to obtain the Permission Pass from his authorized supervisor and shall submit the same at the security office. The time of exit shall be recorded by the security personnel.

Out Pass is the one which is taken whenever an employee going out of the industry for any work related to the industry while he is on duty. He has to obtain the Out Pass from his authorized supervisor or in charge of the concerned section or department and shall submit the same at the security office. The time of exit shall be recorded by the security personnel. When the employee returns, the time of entry shall be recorded by the security personnel.

**Shift Adjustments**

Management allows the employees to adjust their shifts with other employees who are in equal cadre within their respective sections. Those who want to adjust their shifts shall obtain the prior permission of the concerned authority. He shall take the authorization in the form of signature from his supervisor as well as the signature of
the employee with whom he desires to adjust the shift in the prescribed Shift Adjustment Request form and he shall submit the same to the TIME-OFFICE before 24 hours commencement of the shift.

**Overtime**

Within the purview of provisions of Factory Act, 1948, the organisation reserves the right to insist any of the employees to work for an additional time more than normal working time and also may insist to work on Sundays and declared holidays in accordance with the requirements of the workload. This additional work time and work during Sundays and holidays is categorized as OVERTIME. The instructions for the Overtime may be issued from time to time by the management.

**Leave**

There are 3 types of Leave that an employee can avail in the organization.

1. **Casual Leave** is the one that an employee can avail for not any valid reason that he need to state. It can be taken for any of his personal reasons. Every employee is entitled to have a casual leave of 6 days in a calendar year, out of which he cannot take a casual leave for a period more than 3 days at a time. Also, the Casual leave cannot be combined with any other type of leave that is granted by the organization. An employee who joins in later part of year gets casual leave on a pro-rata basis.

2. **Sick Leave** is the one that an employee can avail for reason of him being sick. He may need to produce valid medical certificate or any other evidences for his sickness when insisted by the management. Every employee is entitled to have a sick leave of 8 days in a calendar year which if not availed can be carried forward for next year. But at any time, a maximum of 30 days only can be accumulated as un-availed Sick leave.

3. **Earned Leave** is similar to Casual Leave where in the employee can avail for not any valid reason that he need to state. It can be taken for any of his
personal reasons. But the difference being, the employee is entitled for Earned leave of 1 day for every 20 working days he has worked in the previous calendar year only when he attends a minimum of 240 working days in the previous year as per the provisions of the Factory Act, 1948.

**Festival & National Holidays**

A total of 8 Holidays are allowed in a calendar year which includes Festivals & National holidays. Out of the 8, a total of 4 National holidays are in accordance with the notification of the Deputy Commissioner of Labour. The remaining 4 days shall be decided by the management in consultation with the representatives of the workmen.

**Compensatory Holidays**

Compensatory holidays are provided by the organization as per relevant provisions of the Factory Act, 1948.

**Pay & Allowances**

Various Pay scales are fixed to the employees which is purely based on their ranks [cadres], their experience and the skill-sets.

Following are some heads of structure

1. Basic pay
2. Driving Allowance
3. House Rent Allowance
4. Educational Allowance
4.5 COMPANY PROFILE – GERDAU STEEL INDIA LIMITED

The following data regarding Gerdau Steel India Limited and its Steel plant in Tadipatri mandal has been collected from Secondary Data Sources viz. its website www.gerdau.in and from the various publications and notices issued by the organisation.

4.5.1 INTRODUCTION

M/s. Gerdau is the Globalized Company. It has expanded 64 units in 14 countries all over the world. The unique thing is in Asia continent the Gerdau established its unit in India. Gerdau is a leading producer of long steel in the Americas and one of the largest suppliers of special steel in the world. With over 45,000 employees, it has industrial operations in 14 countries - in the Americas, Europe and Asia - which together represent an installed capacity of over 25 million metric tons of steel per year. It is the largest recycler in Latin America and around the world it transforms, each year, millions of metric tons of scrap into steel, reinforcing its commitment to sustainable development in the regions where it operates. With more than 140,000 shareholders, the Company is listed on the stock exchanges of São Paulo, New York and Madrid. Gerdau’s Indian steel plant is situated at Tadipatri, Andhra Pradesh, and has an installed capacity of 300,000 tons of special steel - long products per year, focused on automotive, defense, railways and related industries.

Tab. No. 4.5.1.1

<table>
<thead>
<tr>
<th>Name of the Company</th>
<th>Gerdau Steel India Limited</th>
</tr>
</thead>
<tbody>
<tr>
<td>Location</td>
<td>Jambulapadu Village, Tadipatri Mandal, Ananthapuramu-515411</td>
</tr>
<tr>
<td>Area</td>
<td>850 Acres</td>
</tr>
</tbody>
</table>
LOCATION
The plant is located near Jambulapadu village between the Kadapa – Bellary road on the North and Chennai – Mumbai Railway line on the South, and is at a distance of 5 Kilometer from Tadipatri town.

GERDAU’s HISTORY IN BRAZIL
Fig. No. 4.5.1.1 indicates the GERDAU’s history in Brazil

![GERDAU's History in Brazil](source)

Source: www.gerdau.in

Fig. No. 4.5.1.1 GERDAU’s HISTORY IN BRAZIL

GERDAU’s HISTORY IN INDIA
Fig. No. 4.5.1.2 indicates the GERDAU’s history in India

![GERDAU's History in India](source)

Source: www.gerdau.in

Fig. No. 4.5.1.2 GERDAU’s HISTORY IN INDIA
4.5.2 EMPLOYEE WELFARE MEASURES PROVIDED BY THE COMPANY

Drinking Water
At all the working places safe hygienic drinking water are provided.

Facilities for sitting
In every organization, especially factories, suitable seating arrangements are provided.

First aid appliances
First aid appliances are provided and are readily accessible so that in case of any minor accident initial medication can be provided to the needed employee.

Latrines and Urinals
A sufficient number of latrines and urinals are provided in the office and factory premises and are also maintained in a neat and clean condition.

Canteen facilities
Cafeteria or canteens are provided by the employer so as to provide hygienic and nutritious food to the employees.

Spittoons
In every work place, such as ware houses, store places, in the dock area and office premises spittoons are provided in convenient places and same are maintained in a hygienic condition.

Lighting
Proper and sufficient lights are provided for employees so that they can work safely during the night shifts.
Washing places
Adequate washing places such as bathrooms, wash basins with tap and tap on the stand pipe are provided in the port area in the vicinity of the work places.

Changing rooms
Adequate changing rooms are provided for workers to change their cloth in the factory area and office premises. Adequate lockers are also provided to the workers to keep their clothes and belongings.

Rest rooms
Adequate numbers of restrooms are provided to the workers with provisions of water supply, wash basins, toilets, bathrooms, etc.

Mediclaim Insurance Scheme
This insurance scheme provides adequate insurance coverage of employees for expenses related to hospitalization due to illness, disease or injury.

Sexual Harassment Policy
To protect an employee from harassments of any kind, guidelines are provided for proper action and also for protecting the aggrieved employee.

Personal Health Care (Regular medical check-ups)
This facility is for extensive health check-up

Employee Assistance Programs
Various assistant programs are arranged like external counseling service so that employees or members of their immediate family can get counseling on various matters.
4.5.3 Health & Safety aspects followed in the organisation

Gerdau Steel is always committed to sustain development of health and safety working environment complying with all statutory requirements. The company undertakes various programmes, methods and initiatives towards this by adopting proactive safety approach rather than reactive ones. The plant uses sophisticated pollution control devices in various departments as applicable. Periodical inspection and assessment of working conditions is considered as the key tool for identifying hazards and risk involved in each activity. The company gives utmost importance to enhance competency of human resources by providing adequate awareness, training with the help of an established full-fledged Training & Development department. Safety is considered to be an integral part of all jobs and that can be achieved only through active participation and involvement of employees from all levels, from top to bottom. The company focuses on workers participation in safety management by establishing Safety Apex Committee and departmental safety sub committees. These committees oversee the implementation of the company’s Health and Safety policy. The company practices best housekeeping practices to achieve excellence in maintaining clean and hygienic working conditions. The company pays keen attention to create a green & healthy environment. In its endeavor towards greenery, the company has initiated various types of afforestation, horticulture and tree planting programs. To comply with the numerous standards and norms stipulated in various statutes of environment conservation, timely Modernization plans are prepared and implemented.

4.5.4 MANUFACTURING PROCESS

The Plant has been designed to adopt the conventional method of producing Iron through the Blast Furnace route. The hot metal produced in the Blast Furnace is either sent to the Pig Casting Machine (PCM) for casting in to pigs or to the Steel Making Shop (SMS) for conversion in to steel. The liquid steel is sent to the Ladle Refining Furnace for further improvement of the quality of the steel, which is then sent to the continuous casting machine for casting in to billets. After casting, the billets are
cooled in the cooling bed and strapped to make bundles and kept in the storage yard for shipping.

4.5.5 SERVICES & UTILITIES

Water Supply
9 Nos. of Tube Wells and 4 Nos. of Infiltration wells located in the Pennar River bed near Bodaipalli village provided the required quantity of make-up water estimated at 500 m3/Hr. The Raw Water from the above wells is pumped to the 200 KL Sump. From there this water flows through 2 Nos. 400 dia M.S. pipes laid across the rivers to the 1080 KL Sump cum Pump House located between the Veerapuram Village and the Raw Water Reservoir. From there the water is pumped to the Raw Water Reservoir, which is made up of 2 compartments with a total storage capacity of 17 days. The Raw Water without any treatment is used for the firefighting purpose. The water, which is filtered and chlorinated, is supplied for drinking purpose. The filtered water is treated chemically to bring the quality of water to have the parameters required for process water. This water is supplied to the different plants, which have their own recirculating systems for cleaning the water and cooling before the water is supplied to the plant. The loss of water due to evaporation is made up by make-up water.

Power Supply
The Main Receiving Sub-Station (MRSS) has been designed to receive the power at 132 KV from AP Transco and is stepped down by means of 132/6.9 KV transformer (2 Nos.) from where the power is supplied to the 6.6 KV switch board located at Blast Furnace Blower Station. The centrifugal blowers of the Blast Furnace are supplied with power at 6.6 KV directly from this switchboard. Other consumer are supplied power at 415 V after the power taken from the 6.6 KV switch board is further stepped down to 415 V through the 6.6 / 0.43 KV transformers located at different locations.
Compressed Air
The 3 Nos. of compressors provided in the Central Compressor Station will produce the compressed air required for general purpose as well as the Instrument air.

Repair Shop Facilities
The repair facilities required are provided in i) Loco Repair Shop ii) Central Repair and Maintenance Shop (CRMS). The equipment provided in the Central Repair and Maintenance Shop includes Lathes, Drilling Machine, Grinders, Milling Machines etc., which are normally required for carrying out the repair works.

Fuel Oil Facilities
The facilities include the provision of a 750 KL storage tank, with the requisite pumping facilities for pumping the furnace oil to the Boiler Plant and other consumers. There is a space provision for adding another tank in future.

Fire-fighting Facilities
These includes extensive network of pipeline for drawing the water from Raw Water Reservoir and supplying the same to various locations for which the fire hydrant have been provided at regular intervals.

Rail Transport
A siding has been created by taking a connection from the South Central Railway from a location adjacent to Challavaripalli Railway Station. A full-fledged marshaling yard has been provided with in the plant boundary wall. The total track length including those provided for the hot metal movement etc., works out to 8.3 K

Roads, Drainage and Naalah Diversion
Extensive road network with the drainage system has been provided. These include 9.0 m wide road : 1.0 KM, 7.0 m wide road : 6.0 KM, 4.5 m wide road : 2.0 KM. A channel has been provided on the southern side of the plant so as to carry out the
water discharged through the Rly. Culverts 715 to 720, up to the road bridge at the North-Eastern corner of the plant.

**Road & Rail Weight bridges**

- Nos. of 40 tonnes Road Weigh Bridges have been provided for weighing the incoming trucks with Raw Material and outgoing trucks with the finished products.
- 100 tonnes on line Rail Weigh Bridge has been provided just beyond the Cast House for recording the weight of Hot metal carried by the ladles.
- A new 150 tonnes Static Rail Weigh Bridge has been provided at Wagon Tippler, for recording the weight of incoming / outgoing Rake-material.

**Chemical Laboratory**

The laboratory consists of the facilities for Conventional analysis of raw materials like Iron Ore, Limestone, Dolomite, Quartzite, Manganese Ore, Coke and BF Slag.

- Spectrometer for analysis of hot-metal and steel
- Orsat Gas apparatus for analysis BF gas
- Digital Flame photometer for estimation of alkalis.

**4.5.6 POLLUTION CONTROL MEASURES**

Dust Suppression System has been provided in the Raw Material Handling Plant to control the emission of dust. De-ducting system has been provided at the Cast House to ensure that the particulate matter emission from the stack is within the permissible limits.

All waste water discharges from the plant are proposed to the utilized in to the process to a large extent and the balance quantity is utilized for developing green belt after ensuring that the characteristics meet the norms stipulated for on land disposal.

All the stacks in the plant are designed and provided with appropriate height so as to ensure their emissions in to the atmosphere are within the permissible limits laid down by the State / Central Pollution Control Boards.