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Cement : A Brief History

Yug S Varma, Chetan R Gavit, Mohammad Rehan R Shaikh, Aadesh Sharma
Guru Gobind Singh Polytechnic, Nashik, Maharashtra, India

Abstract: *This paper attempts to study the history, Evolution of Cement industry in India. Being one of the basic elements for setting up strong and healthy infrastructure, Cement plays a crucial role in economic development of any country. Having more than a hundred and fifty years history, it has been used extensively in construction of anything, from a small building to a mammoth multipurpose project. The history of the cement industry in India dates back to the 1889 when a Kolkata-based company started manufacturing cement from Argillaceous. But the industry started getting the organized shape in the early 1900s. In 1914, India Cements Company Ltd, was established in Porbandar Gujarat with a capacity of 10,000 tons. With the implementation of liberalisation policies of the government in 1991 followed by government's thrust on infrastructure development in the country, the pace of the growth of the cement industry has been unprecedented. At present India is the second largest cement producing country in the world, next only to China both in quality and technology. With the adoption of massive modernisation and assimilation of state-of-the-art technology, Indian cement plants are today the most energy- efficient and environment-friendly and are comparable to the best in the world in all respects, whether it is size of the kiln, technology, energy consumption or environment-friendliness. The economic development of every nation calls for construction activity on an extensive scale. Production of cement in the world has increased over the years.*

Keywords: Evolution of Cement

I. INTRODUCTION

History of cement

The origin of hydraulic cements goes back to ancient Greece and Rome. The materials used were lime and a volcanic ash that slowly reacted with it in the presence of water to form a hard mass. This formed the cementing material of the Roman mortars and concretes of more than 2,000 years ago and of subsequent construction work in western Europe. Volcanic ash mined near what is now the city of Pozzuoli, Italy, was particularly rich in essential aluminosilicate minerals, giving rise to the classic pozzolana cement of the Roman era. To this day the term *pozzolana,* or *pozzolan,* refers either to the cement itself or to any finely divided aluminosilicate that reacts with lime in water to form cement. (The term *cement,* meanwhile, derives from the Latin word *caementum,* which meant stone chippings such as were used in Roman mortar—not the binding material itself.)

Portland cement is a successor to a hydraulic lime that was first developed by John Smeaton in 1756 when he was called in to erect the Eddystone Lighthouse off the coast of Plymouth, Devon, England. The next development, taking place about 1800 in England and France, was a material obtained by burning nodules of clayey limestone. Soon afterward in the United States, a similar material was obtained by burning a naturally occurring substance called “cement rock.” These materials belong to a class known as natural cement, allied to portland cement but more lightly burned and not of controlled composition.

The invention of portland cement usually is attributed to Joseph Aspdin of Leeds, Yorkshire, England, who in 1824 took out a patent for a material that was produced from a synthetic mixture of limestone and clay. He called the product “portland cement” because of a fancied resemblance of the material, when set, to portland stone, a limestone used for building in England. Aspdin’s product may well have been too lightly burned to be a true portland cement, and the real prototype was perhaps that produced by Isaac Charles Johnson in southeastern England about 1850. The manufacture of portland cement rapidly spread to other European countries and North America. During the 20th century, cement manufacture spread worldwide. By 2019 China and India had become the world leaders in cement production, followed by Vietnam, the United States, and Egypt.

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Manufactured of cement

There are four stages in the manufacture of portland cement: (1) crushing and grinding the raw materials, (2) blending the materials in the correct proportions, (3) burning the prepared mix in a kiln, and (4) grinding the burned product, known as "clinker," together with some 5 percent of gypsum (to control the time of set of the cement). The three processes of manufacture are known as the wet, dry, and semidry processes and are so termed when the raw materials are ground wet and fed to the kiln as a slurry, ground dry and fed as a dry powder, or ground dry and then moistened to form nodules that are fed to the kiln.

It is estimated that around 4–8 percent of the world's carbon dioxide (CO_2) emissions come from the manufacture of cement, making it a major contributor to global warming. Some of the solutions to these greenhouse gas emissions are common to other sectors, such as increasing the energy efficiency of cement plants, replacing fossil fuels with renewable energy, and capturing and storing the CO_2 that is emitted. In addition, given that a significant portion of the emissions are an intrinsic part of the production of clinker, novel cements and alternate formulations that reduce the need for clinker are an important area of focus.

First Cement Factory of India

India entered into the Cement Era in 1914, when the Indian Cement Company Ltd. started manufacturing Cement in Porbundar in Gujarat. However, even before that a small cement factory was established in Madras in 1904 by a company named South India Industrial Ltd. Indian Cement Company Ltd produced only one type of cement which was designed by the British standard committee as "Artificial Portland Cement". This company marketed its product in Mumbai, Karachi, Madras and other parts and became a financial success.

At that time India had to import cement from England. The price of the imported cement was higher. Some other factors such as increase in domestic demand, reduction in supply from abroad(due to war), availability of Indian Capital, ample raw material, Cheap labour, support of the government etc. made it a leading industry in India in a short period of time.

In January 1915, a cement unit was started at Katni in Madhya Pradesh

In December 1916, another unit at Lakheri in Rajasthan was started.

During the First World War period, cement production in these three important factories was taken under control of thegovernment and later the control was lifted once the war was over. After the war, 6 more units were launched in India.

In 1924, India's cement production was 267000 tons. However, initially this increased production could not reduce the importsand the industry suffered a rate war. This led to closure of many indigenous units. The Indian companies which were awayfrom ports or commercial centres faced the lacational disadvantage.The above incidents led to the industry stakeholder approach to the government for some kind of protection. The Britishgovernment constituted a Tariff board , which recommended protection of the indigenous industry against the dumping of theimported cement. It recommended raising of the customs duty to 41% which was around 15% at that time, but thisrecommendation was not accepted by the government.

Key Other Landmarks in History of Cement

In 1925, first association of the cement manufacturers was formed as "Cement Manufacturers Association".

It was followed by "Concrete Association of India" in 1927.

In 1930 "Cement Marketing Company of India" was started and this was followed by a quota system on the basis of installed capacity of the factories.

In 1936, all the cement companies except one i.e. Sone valley Portland Cement Company agreed and formed Associated Cement Companies Ltd. (ACC).This was the most important even in the history of cement industry in India. Many more companies were established in the following years.

Before partition India had 24 factories, out of which India retained 19 factories, which annual production of 2.1 million tons. Pakistan faced a problem at the supply side as it had problem of disposal of the cement produced and India faced a problem in demand side as production fell to 2.1 million tons from 2.7 million tons.

After Independence, the partition of the country had a bad impact on the cement industry.

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Cement Expansion Scheme

In 1948, the government adopted the Cement Expansion Scheme which envisaged new factories to increase the production. New factories were established at Bagalkot, Jaipur, Orissa, Travancore etc. In 1950-51, there were 22 operating units with an installed capacity of 3.3 million tons. Cement industry was given a great importance in all the initial five year plans. The targetof the first five year plan was to raise the installed capacity to 5.4 million tons which was achieved. The industry has grown to manifold since then.

The Indian cement industry today employs the most modern manufacturing technology in terms of the unit operations. Some of the modern features of Indian cement manufacturing are given as follows:

- Computerised mine planning
- Efficient blending systems
- Energy efficient comminution (size reduction) processes namely vertical roller mills and roller press
- High efficiency air separators
- Improved dust collection systems employing fabric filters and electrostatic precipitators
- Suspension pre-heaters and pre-calciners
- High capacity kilns with improved heat transfer and low energy requirement
- High efficiency clinker coolers
- Energy efficient and less polluting materials handling systems
- Modern high capacity, electronically controlled bag/bulk packing and dispatch systems
- Moisture and seepage resistant cement packaging

The application of concrete in new (or less common) areas as well as the use of industrial wastes, such as FA or BFS, in concrete is increasing. The following areas appear to have great potential under Indian conditions: Concrete roads: The total length of roads in India, as in March 2002, was nearly 2.5 x 106 km. Out of those, nearly 58 % are surfaced roads. The share of cement concrete roads, within surfaced roads, is less than 2 %. According to one study conducted jointly by the Ministry of Rural Development and the Ministry of Commerce, Government of India, the life-cycle cost of concrete roads works out to be 5.7 % less than that of the bituminous roads, the higher initial investment notwithstanding. The use of concrete in road construction is increasing gradually. The Plate 1 shows a section of 95 km Mumbai-Pune expressway constructed in concrete recently. It is important to build the rural roads with concrete, considering the fact that they often remain neglected from the regular maintenance. The Plate 2 shows a typical rural road constructed in concrete. It will be worthwhile mentioning statistics in some Asian countries, for the sake of comparison. In Japan, nearly 10.5 % of the cement produced goes in the construction of roads and bridges, whereas in China the infrastructure sector, which includes roads, consumes about 40% of the cement. Thus there is a huge potential for the consumption of cement in road construction in India, provided the long-term superiority of concrete roads over bitumen roads is appreciated at all levels2.

II. CONCLUSION

In India The first cement factory was installed in Tamil Nadu in 1904 by South India Industry Limited and then onwards a number of factories manufacturing cement were started. Our country is the fifth largest producer of cement in the world and is expected to become the second largest, after China, by the turn of the century. Cement is a key infrastructure industry. In our country, it has been decontrolled from price and distribution on 1st March, 1989 and de-licensed on July 25th, 1991. However, the performance of the industry and prices of cement are monitored regularly. India is the world's second largest producer of cement after China with industry capacity of over 200 Million Tonnes. With the boost given by the government to various infrastructure projects, road network and housing facilities, growth in the cement consumption is anticipated in the coming years. In order to meet the expanding demand, cement companies are fast developing new plants. The cement industry is poised to add 111 Million Tonnes of annual capacity by the end of 2009-2010, riding on the back of approximately 141 outstanding cement projects. 95% of the production is consumed domestically and only 5% is exported. Demand is growing at more than 10% per annum. More than 90% of production comes from large cement plants. The Indian cement industry comprises of 132 large cement plants with

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an installed capacity of 148.28 Million Tonnes and more than 365 small cement manufacturing plants with an estimated capacity of 11.10 Million Tonnes per annum.

REFERENCES

[1]. "50 years – The cement industry in India – 1914 -1964"- Cement manufacturers'association publication, New Delhi

[2]. Gadhok K.D, "85 years of cement industry-(1914-1999)"- Paramount advertiser,New Delhi – 110 006

[3]. "Cement Statistics – 2006", Cement manufacturer's association publication,Vishnu Kiran Chamber, New Delhi, September 2006

[4]. "Cement 2005" – Published by Context Data Services, S4/24, Giriraj Dharan,Bangur Nagar, Mumbai 400 090 (India)

[5]. Partha Sarathy R & Chakravarthy S.M, "Indian Cement Industry Emerging Trends"– The contact Advertising and communication, 1810, Gyani bazaar, KotlaMubarakpur, New Delhi 110 003 (India)- 1998

[6]. "Capital market"- Published by Capital Market Publishers India Pvt. Ltd, Chembur, Mumbai – 400 071, Vol. XIX/18, 8-21 November, 2004