



CEM WEEK LOOKS CLOSER AT INDIA: THROUGH THE EYES OF AN ENGINEERING CONSULTANT

In this interview, CemWeek talks to Soumen Karkun, Deputy Managing Director and Board Member at Holtec Consulting. Mr. Karkun shares his experiences and viewpoints on the unique strengths of the Indian cement market, areas for possible improvement, the likelihood of vertical integration within the industry, and some of the more interesting technical developments coming out of India.

CemWeek: Tell us about Holtec's work in the cement sector within India and beyond. What are a few of Holtec's more notable projects in India?

Soumen Karkun: Holtec Consulting, incorporated in 1967, is an engineering and business consulting firm. In addition to its cement coverage, the company also services assignments in sectors such as Captive Power, Highways and Bridges, and Steel Detailing.

Holtec Consulting is a part of the Holtec Group, which consists of two other, wholly owned subsidiaries: Holtec Global Solutions FZE operating from Sharjah, UAE, and Holtec Global Solutions, headquartered in India. The former is configured to operate and manage cement plants globally, while the latter provides overall solutions, encompassing services, spares, and consumables.

Since its inception, Holtec has executed more than 3,500 consulting assignments in over 80 countries. Our current workload consists of 195 active assignments spanning 20 countries and 85



clients. Of these assignments, 110 are in the domain of cement engineering and project management, 30 in pre-investment and performance enhancement studies, 25 in captive power and waste heat recovery, 20 in highways and bridges, and ten in steel detailing.

Five hundred staff members with over 6,500 combined years of experience perform Holtec's service delivery. Spanning all functional disciplines, our width of service coverage is, possibly, higher than any other cement advisory in the world.

Since every project has its unique challenges, it is difficult to single out a "flagship assignment." Our credo has always been to give our best to all assignments, irrespective of nature, size, location or client. However, it is my personal assessment that the most significant assignments have been the 10,000 tons per day (tpd) plants, recently engineered by us in infrastructurally challenging environments.

CemWeek: A lot is written about looming overcapacity in India. While we know the arguments that per capita still has ways



Soumen Karkun

to go, what are your thoughts on the operating environment in the next one to two fiscal cycles?

Soumen Karkun: The threat of looming overcapacity, in our opinion, is possibly overemphasized. Players with the intention of sustaining a presence in capital-intensive industries are well aware of the significance of industry cycles, and have devised suitable buffering mechanisms to counter negative impacts in the short term. A supportive feature has been the comparatively low breakeven points in India, affected principally by the very high percentage of blended cement consumption.

In the financial year 2010-11, ending on 31st March this year, consumption in India at 222 million tons per year (mtpy) was 82 percent of the effective installed capacity, almost 25 to 30 percent above the average breakeven! By 2018, India is expected to consume 390 mtpy against an effective capacity of about 400 mtpy.

Notwithstanding this, the next one to two fiscal cycles could see lower capacity uti-

lizations, possibly in the mid-seventies range. This could create a downward pressure on prices. With cost pressures, particularly those for process and transport fuel, likely to escalate, valuations of financially weak players, operating in surplus regions could see a decline. This could spur a sequence of M&A activities. This period could also witness several players creating their overseas manufacturing presence in limestone-rich, economically deprived countries. The principal objective would be to offset domestic risks such as those caused by cyclic over-capacity, political disturbance, depleting mineral resources, high borrowing rates, threat of a realty meltdown, difficulties in land acquisition, and impediments of acquiring environmental and other clearances, etc.

CemWeek: If you had to identify areas where you see the Indian cement industry leading globally, what would they be?

Soumen Karkun: I believe the Indian cement industry excels in several areas. For instance, the industry leads in the installation of the largest number of plants with single line capacities exceeding 10,000 tpd. It exhibits survival skills in intensely competitive and fragmented markets, has experience in retail and rural marketing, possesses strengths in manufacturing the highest volumes of blended cement, and in the ability to produce good quality cement utilizing average quality limestone and poor quality fuel.

CemWeek: What do you see as the most significant areas that India's cement producers need to work on to improve in the near to midterm?

Soumen Karkun: India's cement industry has miles to go before achieving the standards of environmental friendliness that more developed economies have achieved. While the canvas for this is indeed large, reduction of greenhouse gas emissions is, possibly, one of the more actionable areas in the short to medium term.

The dwindling of natural resources is another serious cause for concern. Among these, limestone, fossil fuel and water, if not conserved, could definitely inhibit the long-term growth of the industry. The onus of conservation, until now, has generally been technology-based and, therefore, largely driven by equipment suppliers. Wasteful practices need much higher attention, and cement producers must pick up the baton on directly arresting these in the course of normal operations.

A primary reason for the gap between demand and consumption is the high market price of cement. Producing "affordable cement" without compromising the quantum (not %) of EBIDTA is possibly the one major initiative that would possibly dwarf all other initiatives. This would necessitate the harnessing of technology, amending operating practices and modifying customer mindsets. The net effect would be a huge increase in the customer base and consequentially an explosion in the size of the cement market pie!

The range of products available, progressive volumes and respective quality specifications could be targeted as a focus area of change because of market forces, cost imperatives and alignment of quality standards to those accepted globally. A large component of this change could be affected through technology intervention but would also need incessant customer education, as well as changes in standards and statutes.

Given the exponential growth in cement capacity, a shortage of skilled labor is encountered. Initiatives that need greater attention include lower human dependency through increasing automation, as well as creating and nurturing outsourcing options. Training and exposure to operations in more developed economies is another, as is modifications to operating practices targeted towards reducing the headcount.

An analysis of the components of the final delivered cost of cement shows that 40 percent is constituted by production costs, 25 percent by the transport costs of inputs and outputs, and 35 percent by direct and indirect taxes. Optimization of transportation logistics, spanning modes, and nodes and routes is thus an area deserving a higher degree of focused attention.

CemWeek: Will we see cement makers expand more through vertical integration by adding more ready-mix operations, gypsum and other construction related services?

Soumen Karkun: The extent of vertical integration may be viewed in the context of being either upstream, midstream or downstream.

Historically, upstream integration in the Indian cement industry has been largely restricted to limestone mines only. In recent years, the scope is increasingly enhanced to cover fuel as well as blending materials such as fly ash and slag. While coal mines, both in India and overseas are targeted for acquisition, long term agreements are sought with fly ash and slag producers. As a natural consequence of the high consumption of blended cement in the country, power producers and steel



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producers are increasing their presence in the cement industry with the natural advantage of owning a blending material source, which, otherwise, would have resulted in a negative disposal cost. This connotes a downstream integration phenomenon for the power and steel sector and upstream integration for the cement sector. Conversely, the construction sector is displaying a higher interest in upstream integration through the creation of cement manufacturing facilities.

In terms of midstream integration, an increasing number of cement players are trying to insulate their dependence for

power on erratic, state-owned utilities by setting up captive power plants using diverse fuels. In several cases, these captive plants have been designed for higher capacities with excess power being sold to the state-owned grid at attractive unit rates. Other forms of midstream integration include packing material and several other consumables.

If one were to discount the higher interest displayed by the construction sector through the creation of upstream cement manufacturing facilities, downstream integration by cement players is still in its nascent stage. Though the top cement players have forward integrated into Ready Mix Concrete (RMC) operations, the share of RMC is still less than ten percent of the total concrete consumed in the country. The causes are many. It is, however, undeniable that the acceptance of RMC is gaining increasing popularity, albeit at a slow pace. Forward integration of an increasing number of cement players into RMC is, thus, inevitable. Either state-owned companies or independent private companies operate natural gypsum mining. In recent years, while a few cement players have commenced operations in value-added products such as gypsum boards, given the scarcity of gypsum sources, we do not foresee significant vertical integration in this area.

CemWeek: On the information technology (IT) front, how would you assess the Indian cement sector? What still needs to be done and can be done to increase organizational efficiency?

Soumen Karkun: IT in the Indian cement industry is gaining higher acceptance, albeit at a slower pace than that existent in developed economies. Applications in accounting, materials management and dispatch management abound. The industry also needs to be complimented for the level of control automation that has been attained with commensurate benefits in plant availability, higher process and quality control, and reduced headcount.





The focus for IT development has to shift from information used for record keeping and statutory fulfilment to one that is exception-based and thus, more decision enabling. Management cockpits need to be created by encompassing the concepts outlined in the Balanced Scorecard (BSC).

Primarily only the larger players have implemented integrated Enterprise Resource Planning (ERP) systems. Given the high degree of industry fragmentation, small to mid-sized players have yet to convince themselves of the benefits of ERP systems vis-à-vis their costs. In addition, with many plants located in undeveloped areas, attracting IT talent for operations and IT maintenance infrastructure has been a serious inhibitor to more widespread application. The use of ERP in any activity post packaging, like dispatch plan-

ning, trucks tracking, etc. is low, and the industry needs to consider using IT in areas such as inventory planning and dispatch/ logistic control.

CemWeek: European companies today provide much of the major cement plant equipment in India. What about India's domestic turnkey cement plant manufacturers? Are the Chinese able to compete effectively in India?

Soumen Karkun: Nearly all major European cement plant equipment manufacturers have their design offices and manufacturing workshops in India. Promac, Walchandnagar Industries, and LV Technologies are the major domestic cement machinery manufacturers in India. However, all three cater to smaller capacity plants limited to a maximum capacity of 5,000 tpd.

Chinese plant equipment manufacturers have yet to establish a significant presence in the Indian cement industry. At present, only three complete cement plants have, or are, being built using Chinese equipment. Equipment manufactured in China loses its competitive edge when pitched against equipment manufactured domestically. Duties, inadequate transport/ handling infrastructure and freight costs are, possibly, the principal deterrents. In addition, the Engineering, Procurement and Construction (EPC) mode of project execution, at which the Chinese are particularly proficient, is yet to establish itself in the Indian context.

CemWeek: What are some of the more interesting technical developments in India?

Soumen Karkun: There have been several notable developments in many areas such as unit operations, pyro-processing, and plant technology and operations. Specific examples are seen in:

MINING: Increasing use of surface miners; utilization of marginal grade limestone by employing flotation processes as well as multi-screening to reduce silica and adding calcareous industrial waste for enriching lime; improved drilling and blasting operations through better drilling geometry and explosive technology; choice of larger and more fuel efficient mining and transport equipment, etc.

CRUSHING: Utilization of larger crushers capable of handling 1.5 m x 1.5 m boulder sizes; throughputs exceeding 1,800 tph for a product size of 75 mm, which is acceptable to technologically advanced, raw grinding systems downstream.

RAW GRINDING: Adoption of larger (motor sizes ~ 6,300 KW) and more energy efficient VRMs, with capacities up to 550 tph, with longer roller/ table lives and improved material bed development; throughput augmentation through higher residues acceptable by technologically advanced pyro-processing equipment. In recent times, projects have been offered individually powered, 6-roller (motor sizes, 6 x 2,000 KW), VRMs which could achieve grinding capacities up to 1,000 tph.

PREHEATERS: 6-stage, twin string preheaters with clinkering capacities up to 10,000 tpd; increased cyclone efficiency from 92 to 94 percent; reduction in l/d ratio in cyclones resulting in a pressure drop reduction from 700 to 400 mm WG and a tower height reduction of 10 to 15 m; reduction in the total air requirement from 1.6 to 1.45 Nm³/ kg clinker; improvement in fan efficiencies from 72 to 76 percent.

PRECALCINERS: Degree of calcination pegged at 94 percent to prevent the onset of liquid phase; calciner to kiln fuel ratio



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of 70:30; increased residence time from two to five seconds to improve combustion efficiency of fuel mix would result in more acceptable NO_x values.

KILNS: Redefinition of operating parameters—volumetric loadings up to 7.5 tpd/ m³, thermal loadings up to 5.5 Gcal/ m²/ kg clinker, filling percent of 14 to 16 and kiln speeds up to 5.5 rpm; 2 pier installations with a drop in l/d ratios to 10 to 11; residence time reduction from 30 to 20 minutes; low primary air, multi-channel burners using sophisticated weighing systems; better refractory life through use of improved refractory technology and greater raw material homogeneity and controlled burning conditions; raw mix compositions are also undergoing a change with induction furnace produced slag being used to the extent of eight per-

cent and high carbon fly ash at two to three percent.

COOLERS: Increased adoption of new generation (e.g. “walking-floor”) coolers resulting in increased cooler efficiency from 68 to 76 percent, a drop in air requirement from 2.2 to 1.6 Nm³/ kg clinker, a temperature increase of secondary/ tertiary air to 1,000 °C, increase in cooler loading to 55 t/ m² and significantly reduced installation time by about 20 percent.

FINISH GRINDING: In view of overall cost (capital and operating) effectiveness, large VRMs, with grinding capacities up to 325 to 350 tph for Pozzalanic cements ground at 3,500 Blaine, seem to be the flavor of the new decade. Against current restricted use in blended cements, usage in the times ahead could span all cements as well as slag; technology developments, including metallurgical interventions for reducing wear rates, formation of stabilized clinker beds, etc., seem to have helped their cause. The use of roll presses has also received a boost, particularly after the improvements effected in the material quality of liners giving a life of 30,000 hours.

PACKING & DISPATCH: To meet increased demands, increased adoption of 240 tph, twin discharge, 16 spout packers; to address variable market demands and dispatch modes, flexibility in the dispatch



AP Cement Project at Tadipatri, Andhra Pradesh, India



Captive Thermal + DG Power Plant for 0.9 mio tons per annum Cement Plant at Ariyalur, India

section are being significantly enhanced through appropriate automation.

AUTOMATION, INSTRUMENTATION & PLANT CONTROL SYSTEMS: Aimed at reducing human intervention, automated maintenance (e.g. lubrication) and better process measurement and control. This includes new technologies such as intelligent MCCs, serial bus architecture, satellite communications, etc.

MATERIAL HANDLING SYSTEMS: Targeted towards achieving higher capacity, smaller area requirements, and lower wear rates.

INTEGRATED QUALITY ASSURANCE SYSTEMS: To ensure alignment to International Standards such as EN-197; market demands for higher one-day strengths (by interventions in C3S and product fineness), quicker initial setting (through C3A and gypsum interventions), darker product color (intervention in C4AF and minor constituents), etc. are assuming increased importance.

OPERATIONS RESEARCH AND STATISTICAL TOOLS: Are being increasingly used in optimizing logistical applications such as the management of vehicle queues (seen mainly in limestone transport and cement dispatch), transportation/ transshipment operations, etc.

Significant interventions are being made in equipment choice, maintenance practices, materials' management, and other associated systems, targeted at enhancing plant/ equipment availability; larger plant/ equipment sizes and the consequent high opportunity cost of downtime are drivers that are enhancing the relevance of such interventions.

With environmental norms getting more stringent, technology development and acquisition are being harnessed to keep pace; e.g. possible lowering of dust emission norms, from 50 mg/ Nm³ to 10 mg/ Nm³ are resulting in the increased adoption of hybrid filters; the pressure to reduce CO₂ emissions are unleashing a variety of clean technologies and practices such as cogeneration of power using waste heat, incineration in cement kilns of waste materials to meet the dual objectives of waste disposal and cost reduction, separation of CO₂ from kiln exhaust gas and its utilization in value products, etc.

ENERGY EFFICIENCIES: A variety of technological initiatives, targeted towards effecting significant improvements in energy consumption is underway. As against current "best" values of 680 kcal/ kg clinker and 65 to 70 kwh/t of blended cement, these initiatives are expected to result in thermal energy consumption dropping to 665 kcal/ kg clinker and electric energy consumption to about 60 kwh/ t of blended cement.

BIO

An engineer-MBA by qualification, Mr. Soumen Karkun is currently the Deputy Managing Director and Board Member at Holtec Consulting, one of the top cement advisories in the world. Other than executing his corporate responsibilities, he looks after the Process Engineering, Raw Materials (Geology & Mining) and Business Consulting functions and is thus responsible for all consulting assignments relating to pre-investment and performance enhancement activities.

Associated with the cement industry since 1972, Mr. Karkun's initiation to the industry was in the area of plant operations. Joining Holtec Consulting in 1978, Mr. Karkun has led over 500 multi-functional consulting assignments for over 100 clients in 45 countries.

Mr. Karkun's primary expertise is in delivering holistic consulting solutions in which multi-functional inputs and implications are synergistically integrated. An accomplished speaker, Mr. Karkun has also led a variety of training related initiatives, including institution building, courseware development and teaching, and has over 20 international publications to his name.

ALTERNATE FUELS: While lignite, petcoke, tires, bagasse, rice husk, etc. have been around for some time now, several plants are already using or currently investigating hospital refuse and municipal waste as workable alternatives. 🌀