

NOVEMBER 2016

VIEWPOINT

OFFICIAL QUARTERLY MAGAZINE OF CEAI

www.ceai.org.in



Consulting Engineers Association of India

... creating value for engineers

CONTENTS

- 1 From Chief Editor's Desk
- 2 Past, Present & Future of Civil Engineering in India
Mr. A. P. Mull
- 10 The Structure Works of Mr Mahendra Raj
A review by **Dr Samarjit Chatterjee**
- 12 Construction Chemicals Industry in India
Mr. M. A. Waheed
- 14 REDECON 2016-Recent Developments In Design and
Construction Technologies of TALL STRUCTURES- A
Report
Mr. Mainak Ghosal
- 15 CEAI News
- 17 FIDIC News
- 18 Other News, Views & Notes

EDITORS BOARD

Chief Editor

Dr. Samarjit Chatterjee

Members

Mr. Sudhir Dhawan, President
Mr. V. P. Agarwal
Mr. Raju Gogia

Mr. A. P. Mull
Mr. Somenath Ghosh
Mr. L. D. Gupta

VIEW POINT

Input from Members

The next issue of the View Point will be published in March 2017. Members are requested to send articles and other material for incorporation in the next issue of View Point by 15th February 2017. The material could inter alia comprise:

- Technical articles
- Photographs of current or completed projects (completed in last one year)
- Awards received by an individual/ organization

ADVERTISEMENT IN VIEW POINT

VIEW POINT is quarterly publication. It is circulated to all CEAI Members, Government Departments, Public/ Private Sector Undertakings, Construction Firms, Contractors, Consultants, Foreign missions in India and others related to engineering profession.

In order to encourage members and others, we have reduced the advertisement tariff considerably.

The advertisement tariffs per issue are given below:

ADVERTISEMENT TARIFF

Rate: Back Cover	-	Rs. 15,000/-
Inside Front Cover	-	Rs. 10,000/-
Inside Back Cover	-	Rs. 10,000/-
Full Page	-	Rs. 5,000/-

In case the advertisement is to be inserted in consecutive four or more issues of View Point, a rebate of 20% will be admissible.



Message From Chief Editor

The country is undergoing a shock therapy. The surprised announcement of demonetisation of higher denomination currency notes, has put the country into an unprecedented cash crunch, that is now slowly abating. This drastic action has been aimed towards eradicating unethical use of money. The success level of this initiative will be apparent only in the days to come. We only hope that it brings in the desired result.

Ethical conduct in all spheres of human activities is an essential requirement for a fair society and is conducive to sustainable growth for all. This is equally applicable in the pursuance of profession, which, most unfortunately, we find profoundly being violated many a times, just for some unfair gains, that does do no good in the long run. It is our duty to be vigilant and cautious against this evil practice.

In CEAI, change of regime is imminent, the biannual election of a new Governing Council is in process. Shortly, the new Governing Council will be installed. With it, the new office bearers. I congratulate the incumbent President Mr. Sudhir Dhawan and his team for excellent running of the organisation and taking care of the members. Mr. Dhawan has been an outstanding President and served CEAI selflessly. His many initiatives have yielded good results. I hope that the new team will do even better and wish them all the best.

With this issue, my tenure as your Chief Editor, is also coming to an end. Due to various constraints, mostly at my end, at times, publishing View Point got delayed. I hope the readers will generously overlook my unintentional lapses. However, I may mention here that without great effort of Mr. L. D. Gupta, Director, and his team throughout, many of the issues would not have seen the light of the day. My sincere thanks to him. I also thank all the members of the Editorial Board, particularly Mr. A. P. Mull, Past President, for their contributions and support, in bringing out View Point.

With my best wishes and kind regards.

A handwritten signature in blue ink that reads "S. Chatterjee".

Samarjit Chatterjee

Past, Present & Future of Civil Engineering in India



A P Mull

Former Managing Director, Tata Consulting Engineers Limited
Past President Consulting Engineers Association of India

Archaeologists and Historians tell us - The East is the Cradle of Civilisation

Civil Engineering principles and practices have been the backbone of society, enabling and empowering its web or tissue of social interaction and trade. Looking back from the time that mankind first appeared right up to the present times let us see as to how engineering evolved.

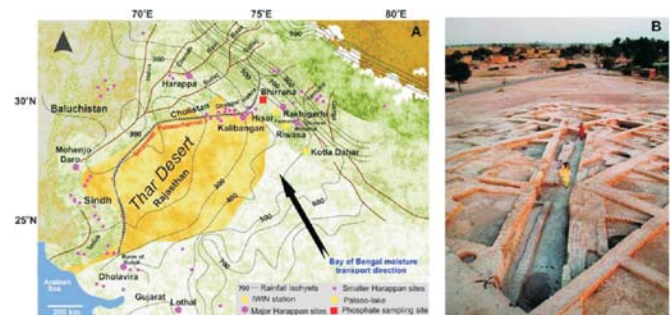
In a state of nature which existed during the pre-historic period, man roamed the earth unsheltered from the elements of nature. However, being a rational animal, man used his intellect to look not only for protection from the elements of nature but also beasts of prey. Man discovered that caves which afforded a single entrance could serve the needs. Thus were born the cave dwellers. However, where there were no caves, man had to resort to other forms of protection - timber logs or bamboos propped to form a cone with covering of leaves to keep out wind and rain. Where there was no timber or bamboo other forms of shelters which utilised readily available local raw materials - earth and/or stones, developed. Woven covers would also have made their appearances where forests abounded. Woven cloth came later when man learned to harness nature's abundance. That gave rise to tents covered with cloth and canvas (originally made from hemp). Thus Civil Engineering is the oldest engineering specialization that developed. All the rest developed much later once the basic requirement for a shelter coupled with the prime requirements for survival - air water and food were satisfied. Civil Engineering has been the king post in the growth and maturing of society through its necessity for public works - roads, buildings, water supply systems, waste water disposal systems, dams, moats, bridges, fortifications, etc.

The earliest body of knowledge regarding the rules for planning and constructing habitats, temples, etc. in India

are believed to be the *Vastu Shastras*. The Indus Valley and Harappan Civilisations were also, reportedly, founded on the principles of the *Vastu Shastras*.

The archeologists are finding that they were very well laid out with areas segregated for different trades. There are wonderful and beautiful edifices which stand as testimonies to the knowledge of the Indian engineers and the perfection to which they were built based on handmade drawings, simple tools of the various trades and using manpower.

The basic materials of construction were mud bricks and stone, where the later was available, bonded using mud mortar. Wood was also used where available.



Source: <http://www.ancient-origins.net/news-history-archaeology/timeline-harappan-civilization-pushed-back-2500-years-researchers-find-new-020856?page=0%2C1>

As per Rajiv Malhotra and Jay Patel "Most students learn about the ancient cities of the Middle East and China. How many have even a basic understanding of the world's oldest and most advanced civilization - the Harappan or Indus-Sarasvati Valley Civilization in India? The Indus-Sarasvati Civilization was the world's first to build planned towns with underground drainage, civil sanitation, hydraulic engineering, and air-cooling architecture. While the other ancient civilizations of the world were small towns with one central

complex, this civilization had the distinction of being spread across many towns, covering a region about half the size of Europe. Weights and linguistic symbols were standardized across this vast geography, for a period of over 1,000 years, from around 3,000 BCE to 1500 BCE. Oven-baked bricks were invented in India in approximately 4,000 BCE. Over 900 of the 1,500 known settlement sites discovered so far are in India.

Since the Indus-Sarasvati script is yet to be decoded, it remains a mystery as to how these people could have achieved such high levels of sophistication and uniformity in a dispersed complex and with no visible signs of centralized power.

For instance, all bricks in this civilization are of the ratio 1:2:4 regardless of their size, location or period of construction. There are many pioneering items of civil engineering, such as drainage systems for water (open and closed), irrigation systems, river dams, water storage tanks carved out of rock, moats, middle-class style homes with private bathrooms and drainage, and even a dockyard; there is evidence of stairs for multiple-storied buildings; many towns have separate citadels, upper and lower towns, and fortified sections; there are separate worker quarters near copper furnaces; granaries have ducts and platforms; and archeologists have found geometric compasses, linear scales made of ivory. Indians also pioneered many engineering tools for construction, surgery, warfare, etc. These included the hollow drill, the true saw, and the needle with the hole on its pointed end."- From 'History of Indian Science & Technology' by Rajiv Malhotra and Jay Patel.

Thus from the dawn of civilization, engineering has played a major role. In all the historic periods of India, engineering planning and design were central to development and enhanced the trade between habitations and even foreign lands.

Moving on to later periods there are many ruins as also well many preserved monuments. They would number in thousands. A list of the protected sites and monuments is available on the Archaeological Survey of India website. Apart from that there are others which are still in use. All these *inter* aliacomprise township sites, citadels/ forts, palaces, buildings, temples, caves, masjids, churches/ cathedrals, towers, water bodies, *bouadies* (wells), bridges, dams, barrages, canals, irrigation schemes, roads, et al. Many of them have something unique. Since most are known and well documented I am not going to dwell more on them.

Let's move on to the present times. The words 'Architect' and 'Engineer' were earlier used synonymously and there was no clear distinction. The former was more in vogue until modern times. The training and qualification requirements for Architects, of different designations were also prescribed in the ancient Indian texts. They also included the codes for their conduct.

The word 'engineer' was originally associated with 'military engineering'. It was only when the word was used to refer to public works which were non-military works that the term 'civil engineer' was introduced. Initially all engineering was covered under the term 'civil engineering' as opposed to 'military engineering'. However, over the years, with increasing size and complexity of projects, other disciplines of engineering emerged. With them their codes of practice also developed to cover the new materials and technologies. Civil Engineering per se now has many specializations.

Although engineering has been deployed since pre-historic times, however, the modern systematic journey of the engineering profession in India started when the Roorkee College was established in 1847 AD as the First Engineering College in the British Empire. The College was renamed as The Thomason College of Civil Engineering in 1854.

Large scale works have historically been the prerogative of the government. The public works were executed as per the designs and standard practices of engineering adopted by the various Public Works Departments. Initially the works were mostly for buildings, monuments, roads and allied services. Later on new departments for Electricity, Irrigation, Aviation, Shipping, etc. were created once the works in those increased. Private construction was mostly based on thumb-rule and standard local practice.

The profession of private engineering services in India as we know it now, dates back to the period soon after Independence, when the country institutionalized a program of planned industrial development. At the onset of 1950's, projects in India were implemented on a turn-key basis by overseas engineering organizations with limited involvement of the Indian engineers. However, a burgeoning economy, demanded that in-house capabilities be developed for end-to-end designing and implementing of engineering projects to further the industrial development in the country and make it truly independent. That catalyzed a transition process with the emergence of engineering organizations in the 1950s and 1960s, in both the private and the public sectors.

For a little over a decade, the private organizations were centered around an individual or a small group of professionals committed to delivering engineering excellence. Gradually, multi-disciplinary organizations and conglomerates operating on systems approach emerged.

That was also a time when science and technology were drawing great attention since they were imperative to deepen the understanding of the field and help build capabilities.

The engineering practice progressed from just buildings and roads to encompass airports, ports & harbours, thermal & hydro power plants, nuclear facilities, oil & gas complexes, chemical & industrial plants, mining, minerals and ferrous & non-ferrous plants, space, etc.

The engineering profession has since evolved and demonstrated not just growing maturity in its capability and demonstrated ability to rise to the occasion and deliver the best but also leadership in taking greater ownership of widening their horizon of capabilities in new fields as and when the need arose.

On account of the complexity and inter-disciplinary nature of modern projects a Civil Engineer also needs to be generalist to be able to correctly comprehend and translate the multi-disciplinary requirements into a cohesive unit and deliver the project fit for its purpose. The engineering profession in India provides world-class standards for multi-disciplinary complex and large projects as well as state of the art for newer areas. The engineers are keeping pace with the latest digital developments in their field and even innovating and developing new software in-house where necessary. Today there are a large number of engineers working on projects either from their home office or project office.

India today is seeing a boom in development. Buildings-both commercial as well as residential many of them are now Tall buildings (mostly limited to Mumbai) are changing the sky line. Smart City projects are moving forward. Mega projects are also taking shape in the sectors of transportation -roads & highways, railways& metros, airports, ports & harbours, water supply, waste water, solid waste management, river cleaning, etc. are the order of the day in India. Development in other sectors is also picking up but has still to gird up to match that of the above areas. There is tremendous scope for development of tourism in the country.

It may be best to take that sector on under the People Public Private Partnership (PPPP) model. For that the local Society would be the People partner, the relevant Government agency the Public partner and a private organization or a group of them being the Private partner.

Let us see some of the major projects that have been completed in the past few years or are in progress.

World One: It is a supertall residential skyscraper under construction in Mumbai. Once complete, it will be the tallest building in India, and the second tallest residential tower in the world.



Gujarat International Finance Tec-City (GIFT): Located between Ahmedabad and Gandhinagar it will be a major financial hub and will host corporate and regional offices of companies, a trade centre, housing colonies, and a centre for the domestic financial sector. GIFT city is designed to be eco-friendly - it will use an energy-efficient district cooling system instead of air-conditioning.



Bandra-Worli Sea Link: It connects Bandra in the Western Suburbs of Mumbai with Worli and a part of the proposed Western Freeway. The Sea Link is the longest bridge above water in India followed by Pamban Bridge.



Mumbai's Eastern Freeway: Built to reduce travel time between South Mumbai and the Eastern suburbs, it connects P D'Mello Road to the Eastern Express Highway at Ghatkopar and covers a distance of 16.8km.



The Kathipura interchange is the largest cloverleaf flyover in Asia, situated at Alandur in Chennai.



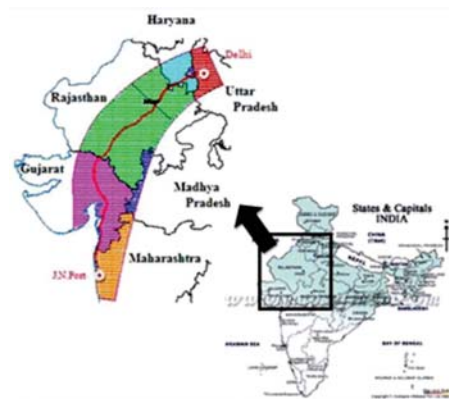
Yamuna Expressway: It is a 6-lane (extendable to 8 lanes), 165 km long, controlled-access expressway, connecting Greater Noida with Agra in the Indian state of Uttar Pradesh. It is India's longest six-lane controlled-access expressway stretch



Chenab River Railway Bridge: Expected to complete by 2019, it will be the highest railway bridge in the world, over river Chenab, 359 meters above the river bed in Katra, Jammu-Kashmir. The 1.3km-long bridge is a part of the 73km-long Katra-Dharam section of the Udhampur-Srinagar-Baramulla Rail Link (USBRL) project.



Banihal-Qazigund tunnel: This section includes the 11.2km Pir Panjal tunnel. The section connects the Jammu region to the 119km Kashmir Valley line between Qazigund, Srinagar and Baramula.



Delhi Mumbai Industrial Corridor (DMIC): It will comprise power plants, smart cities, industrial hubs,

airports, ports and an expressway stretching 1,500 kilometres. When it's completed, it will be the world's largest infrastructural project. Starting outside Delhi and ending in Maharashtra, the Delhi-Mumbai industrial corridor has been inspired by Japan's Tokyo-Osaka industrial corridor.



Delhi Metro: Starting with the first metro being built in Kolkata in 1984, metros have become lifelines in some of the major cities in India. The Delhi Metro started its operations in 2002 and is one of the most disabled-friendly public places in the country, with all stations equipped with ramps, low level control panels in the lifts, and buttons in Braille. With 208 trains serving 140 metro stations, it is the first metro rail and rail-based system in the world to get "carbon credits for reducing greenhouse gas emissions."



Hyderabad Metro: Named one of the top 100 strategic global infrastructure projects at the Global Infrastructure Leadership Forum held in New York, the Hyderabad Metro Rail project will be the world's largest project under Public-Private Partnership. It is also the world's largest elevated metro and is expected to provide transportation to over 1.7 million commuters by 2017.

T3 Terminal Delhi: The Indira Gandhi International Airport was ranked the world's best airport in handling 25-40 million passengers per annum category by ACI 2014 and is South Asia's largest aviation hub. The T3 Terminal has added to



the glory of IGAI. With a capacity to host 34 million passengers annually and is the 24th largest building in the world. It also has India's first automated parking management and guidance system in a seven-level car parking area for 4,300 cars.



Mumbai's T2 terminal, with a four-storey building and a capacity to handle 40 million passengers annually, is also nothing short of extraordinary. It also has the country's largest airport escalator at 11.6 meters. The car parking can accommodate 5,200 cars and the steel used to build the roof of the terminal is enough to construct two Eiffel Towers.



Netaji Subhas Chandra Bose International Airport, Kolkata: It can handle 25 million passengers annually, a leap from its previous capacity of 4.8 million a year. It has a 195,000-sq. metre, five-level integrated passenger terminal building.



Chandigarh International Airport: The recently constructed airport at Mohali is the first airport in the country that is 'totally green'. Spread over 53,000 sq. m, the airport has used environment-friendly green technologies that makes it one-of-its-kind, not only in India, but also in the world. The airport is constructed in a way that no artificial lights would be required to illuminate it during the daytime. It also has a transparent façade with low heat-gain glass which reduces the need for a large amount of air conditioning. The rooftop of the terminal has a 200kW solar plant which is enough to meet the major power needs of the building. Forty percent of the airport is illuminated with LEDs



Navi Mumbai International Airport: The airport, a PPP project, has been delayed by land acquisition and environmental issues but pre-development works started in March 2015.



Narmada Canal Project: Gujarat's canal-top solar project covers a 5.5 km section of the Narmada canal with a photovoltaic grid. This 10 MW solar project is one of its kind in the world. Located at Chandrasan village near Mehsana,

the plant is designed to generate 1.6 million units of electricity per year along with preventing water from evaporation. The project will eliminate the need of land solar projects and is expected to save two billion litres of water annually.



The Chennai Mofussil Bus Terminus: Spread over an area of 37 acres, it is the second largest bus station in Asia and is also accredited with the ISO 9001:2000 quality certification for its efficient management and functioning. This terminus has the capacity to handle 2,000 buses and 200,000 passengers daily. The bus station has 64 CCTV cameras and a 'child-friendly' centre for lost kids. The huge parking lot can accommodate over 2,500 two and four wheelers.



Jawaharlal Nehru Port Trust is India's biggest public container handler. It has entered a new era and ready to receive mega-ships after dredging its fairway to 14m.

Petrochemical Complex at Dahej: Oil and Natural Gas Corp (ONGC) Petro additions Limited's (OPaL) mega petrochemical complex at Dahej will be used to manufacture polymers along with products like detergent bottles, milk jugs, water pipes, etc. It will also export products to countries like China, Singapore, Turkey, Africa, Pakistan, etc.

How ready are the engineers to take up the current and



future challenges? The current challenges are being ably dealt with by the present generations with mentoring by the past. Let us recall that the past generations have all grown up doing hand calculations using log tables and slide rules. They used to get a feel of what they are designing since it unfolded in front of their eyes. Even the drawings were hand drawn and any error could be easily detected by the engineer or even the experienced draughtsmen. Now we have got into relying on the computer programme's output. The issue of validation of the programme is not taken seriously now and hence there are great chances of undetected errors. Even one wrong data entry could lead to a disaster. It is therefore essential that engineers first validate the programme for the problem to be solved and also check and counter check all data entry. Thereafter the results should also be checked to see if they conform to the commonsensical behaviour expected.

Engineers need to dwell into details for all that they are associated with. Nothing should be taken as granted as being understood. It's the duty of the engineer to be specific to the last detail. Constructability, Operability and Maintainability must be given full consideration. Engineers also need to think beyond the codes since the latter also will not cover futuristic requirements and new materials to deliver beyond the state-of-the-art projects.

The aspect of Design Life of Structures is still not covered adequately by our codes but it is a factor which must be made central since around that all material selection and design of structures and system depend. The client must be advised, in writing, as to the Design Life the project and its components are being designed for. The buy in of the client is essential. Engineers need also to ensure that each and every part is designed as per codes, standards and

standard accepted practice and constructed accordingly to result in sound and robust structures and systems fit for purpose.

You'll must be aware of the incidence of the crane collapse in Mecca. I just came across a report a few days ago that the consultant had warned in writing about the same. Those who chose to ignore it are now facing charges. As engineers it is our duty to advise the Client in clear uncertain terms as to what is the right thing to do. All advice must be reduced in writing and an acknowledgement got signed by the client, so that the record cannot be disputed later on.

Talking about Education, we find that there is a dearth of good faculty now a days. Besides the students take the computer results as gospel truth. They do not question if the software they have used guarantees that it is bug free? They same applies to many professional users also. If that is the case then who is responsible? The answer is the user, not the software developer or the vendor. Legally, the designer and constructor are responsible for whatever they design/ construct. When that is the case it becomes their duty to be absolutely sure of what they do.

Let's move on to materials. What are the new materials that Civil Engineers would be looking at in the future? Nano-materials especially Graphene is one material which I think has tremendous scope in many fields. Its use in Fiber-reinforced composites would aid in rehabilitation of existing structures and as technology develops bars made from it could be used as reinforcement. Cement composites will need to be developed to get better properties, higher strengths and durability. Smart materials are also being developed. By smart, I imply those with sensors and even those "that can change their properties in response to external conditions". 3D printed forms made from nano-

materials would also change the way we look at materials for construction.

The Defense Advanced Research Projects Agency, USA has announced a program that would combine the structural properties of traditional building ingredients with attributes of living systems to offer a class of living material that could be grown where needed, self-repair when damaged and respond to changes in their surroundings. These are termed as Engineered Living Materials (ELM).

Engineering is perhaps the largest knowledge based profession and, contributes significantly to enrich and improve the well being of society. Civil Engineers in particular are the sine qua non for the development and growth of any country to provide it with buildings, bridges, water, waste water, power, transportation, etc. They need to be recognized and honoured just like Sir Mokshagundam Visvesvaraya. Taking a cue from him let us bring more under our wings as he did by developing as an all round human being.

Many of these will be possible once the Engineers have the authority and independence to be able to put forth their considered reports which should not overlooked or set aside for the sake of expediency for other non-technical reasons. This can only be possible when the engineering profession is brought under

legislation and the engineers made accountable and responsible for their reports. Even 70 years after Independence, the over 1.5 million engineers are not pursuing a legally recognized profession since they are not governed by any legislation. However, Architects, Doctors, Advocates, Chartered Accountants et al are governed by legislations. Some engineering associations have taken up this issue with the Ministry of Human Resources but it is not making much of a headway. All the same we are not going to give up.

The engineers should be responsible and accountable only to the regulatory body formed under legislation. It must be a common body for the country, as for other professions. Once an engineer is registered under that national regulatory body, no further registration should be necessary with another body, anywhere else in the country.

Awake, Arise and Be Master Engineers

What should be a shibboleth for us in keeping with what the Vedas propound - to systematically evolve as human beings to higher levels of perfection?

Civil Engineering has had a glorious past, it is having a great present and the future is going to be brighter.

NATIONAL REGISTER OF ENGINEERS

by

CEAI in collaboration with other professional associations

1. OBJECTIVE

- To establish discipline wise data base of Engineers.
- Registering those engineers who provide quality services to their clients

2. ELIGIBILITY

- Individual Engineers
- Engineering Companies

Members of other engineering professional bodies qualify automatically.

3. MEMBERSHIP FORM

- Membership form available with CEAI.

For details: Please contact CEAI Secretariat.

The Structure Works of Mahendra Raj



A Review by
Dr. Samarjit Chatterjee

Mr. Mahendra Raj is perhaps the most known face in structural engineering design in the country, for the built environment, particularly related to buildings. Having graduated as a civil engineer, from Punjab College of Engineering and Technology, Lahore, in undivided India, seventy years ago, in 1946, he has been intimately involved in the profession in different capacities, finally emerging as a leading structural engineering consultant. The long path that he has traversed so far, is strewn with innumerable achievements in structural engineering. To compress the long, eventful and extraordinary professional journey in the limited space of a book was certainly a great challenge. This has been squarely met, without losing on the flavor or fragrance, in any way. This was a stupendous task, well accomplished.

While dwelling mainly on the landmark projects designed by Mr. Raj, the book also provides a glimpse into his life - development of a structural engineer, eventually becoming the doyen of the profession. At the start of his professional career, he worked as a civil engineer in Punjab PWD, first in Lahore and later in Shimla, consequent upon the partition of the country. A few years later, he got inducted into the project of building the new city of Chandigarh and got drawn into the specialized area of structural engineering. He came in contact with the master architect and planner Le Corbusier of international fame, who appreciated his talent. Mr. Raj contributed significantly on the structural design of a couple of outstanding buildings, such as the High Court Building with very large balanced cantilever roof, and got baptized as a structural engineer.

This exposure made him pursue deeper into the specialized field, through further education in the USA and then working in a leading structural engineering consultancy firm there. This provided him the opportunity to work under the tutelage

of an innovative structural engineer Mr. Charles Whitney and designed a few extraordinary building structures, with applications of large span folded plates, arches and domes. Innovation was at the core. For example, the design of 122m diameter concrete folded plate dome to cover 17000 seat Assembly Hall of the University of Illinois, in the fifties, was ahead of its time. Challenge of these jobs not only made him more resolute structural designer but also made a romantic relationship blossom, that eventually culminated in his starting a structural engineering consultancy practice in India. He came in touch with a couple of other talented structural engineers of his generation from India, with similar inclination, whom he partnered with, briefly. He also met some highly talented architects, who admired his talent and skill, to work with, on many landmark projects, offering huge structural design challenges. He was never shy to meet these challenges head on. All that followed is a symphony of impressive building structures in India. He was there at the right time, at the right place and in the right company to complete the orchestra.

The book makes primarily pictorial presentations, chronologically, of his important works, all landmark buildings, with brief descriptions of design philosophy, salient features and some details, particularly, through reproduction of many of the critical detail drawings. The reinforcement detail drawings are not only meticulous but also stunningly beautiful works of art. In the days, before the advent of computer aided design and drafting, it required tremendous effort to turn such complicated details at crucial junctions, simple enough for the site engineers and their workmen to implement correctly, with ease. These drawings are testimony to his dedication. He has been an artist and his art form has been building structures. He was not only conscious of aesthetics of the structures that he was designing, but also the aesthetics of his presentations, in

the detail drawings. One must also admire the archival preservation of the numerous drawings produced under his guidance, over such a long span of time. This happened only because these were borne out of love.

The most admired work of Mr. Raj has been the Hall of Nation in Pragati Maidan in New Delhi. It is a reinforced concrete three dimensional space structure, perhaps, the largest of its kind in the world. Besides it was a pioneering effort, highly innovative. Certainly a great achievement, he accomplished in relatively early stage of his consultancy practice, at the beginning of the seventies. His strong affinity and understanding of mathematics made it easier for him to conceive the complex geometrics of the structure and subsequent analysing, designing and detailing.

He continued with missionary zeal and gifted many more such works to the posterity. To name a few - DCM Pavilion,



New Delhi, Hindon River Mills, Ghaziabad, NCDC Office Building, New Delhi, Indoor Sports Stadium, Srinagar, Hall of States, New Delhi, Jeevan Bharati Building, New Delhi, SCOPE Complex, New Delhi, State Trading Corporation Building, New Delhi, Jaisalmir Airport Terminal. Earlier, he had accomplished Gandhi Memorial Hall, New Delhi, Municipal Stadium, Ahmedabad, Tagore Memorial Theatre, Ahmedabad, Akbar Hotel, New Delhi, among others.

All these structures, and many others, stand tall, as testimony to his mastery of innovative design of building structures, in India. It was completely opposite to the contemporary tendency of designing structures mechanically, without really understanding its behavior. His illustrious life and his immense contribution towards design of reinforced concrete building structure, has made him a father figure in the fraternity of structural engineers. His name has become synonym with the profession. His life seems to have merged with the structures he designed and turned into a ballad.

He has been able to expose the structures with all its beauty, that usually remain buried within the buildings. He infused life into the building structures. His mastery in bringing out innovative solutions to meet the most difficult and tricky situation has been way ahead of his other contemporaries. He was also lucky to have worked as a team with most of the outstanding architects of our time. He developed close association with them, based on mutual understanding and respect, on a level platform.

I can understand the dilemma of the editors of the book, in containing its size. It must have been a problem of plenty. Out of the vast portfolio, which ones to pick up, since most are extraordinary and different. Though a chronicle of long professional activity would tend to be bulky, but, perhaps, a little more slimming would have made it more attractive for a reader. Apart from that, the book is very well conceived, beautifully printed and presented, aptly edited by Vandini Mehta, Rohit Raj Mehndiratta and Ariel Huber, making the book a collectors' item. The case study on Hall of Nation and Hall of Industries has been penned extremely well, but, then, that is naturally expected from Mr. Raj, its creator. Appending the book with a couple of interviews and a conversation with Mahendra Raj and a couple of essays has added much desired spice to the contents - making it interesting to read. I congratulate the editors for bringing out such a wonderful book, preserving the monumental contribution of Mahendra Raj.

Construction Chemicals Industry in India



M A Waheed
Chairman,
Perma Construction Aids Pvt Ltd

GENERAL

From the beginning of twentieth century cement concrete and cement mortar based on Ordinary Portland Cement, have been accepted as the main building materials for the construction of buildings and the infra-structures, considering the ease, speed and the strength they offer. But this new building material that is the Ordinary Portland Cement, suffered from some initial drawbacks such as shrinkage cracks and leakages when compared to the then existing lime concrete and lime mortar. Hence, the product needed some modifications to get over its inherent weaknesses, which was achieved by use of some chemicals as additives.

With the increase in demand for bigger, higher and stronger structures in various environmental conditions, the ordinary concrete required further modifications to perform as per the expectations and deliver the end strengths and other parameters in various climatic conditions and different functional requirements. This was again achieved through addition of chemicals to modify the behaviour of cement concrete to give the desired end results. With time the performance demands on concrete increased and research and development of chemicals for modification of concrete became a regular industry which is now known as

CONSTRUCTION CHEMICALS INDUSTRY

To keep pace with the developments, the construction chemicals industry took upon itself to develop products which not only make construction of modern structures possible by imparting easy workability, higher strength development characteristics and expected performance in extreme environmental conditions but also to maintain structures in various climatic conditions thus extending the life of the structure. Concrete admixtures have now become an essential fifth ingredient of concrete and construction. New structure can't be imagined now without

the use of construction chemicals in various stages of construction.

CONSTRUCTION CHEMICALS

Starting from water proofing compounds, construction chemicals have expanded their range to ease the workmanship in demanding situations at various stages of construction. Today each full-fledged construction chemicals manufacturer manufactures fifty to hundred various construction chemicals. These construction chemicals can be generally divided into the following groups:

- Water Proofing Compounds
- Admixtures for concrete and mortars
- Construction and workmanship aids
- Tile Fixing Adhesives and Joint Fillers
- Coating and protection products
- Repair and Renovation Products

CODES AND STANDARDS

As Portland Cement was developed in Europe so also were the construction chemicals. Suitable codes and guidelines were also framed there to take the full advantage of these new developments in the advancing civil engineering industry. In India the use of Portland Cement was adopted very fast and the government recognized the cement industry as being essential in Nation building, and thus supported the industry by easing the norms in its classification in excise and its treatment in Sales Tax, etc. in the beginning of the twentieth century itself. This industry grew rapidly, but after Independence the construction practices and the building technology did not develop with the same speed leaving civil engineering codes and practices in India, far behind vis-à-vis the developed nations. Because of that Construction Chemicals were very slow to enter Indian market, and did not get the due recognition initially, which they deserved. However, now construction

chemicals are generally thought of when the structure is leaking or in distress or in situations when some extraordinary requirements are expected out of structural member such as very high strength bridge girder or superior industrial floors, etc. For creating safe, healthy structures for mankind there is need to revise the building codes and civil engineering practices at shorter intervals and also overhaul the civil engineering syllabus in the engineering colleges to incorporate the latest technology and available materials. There is a need to create new codes for civil engineering and also for construction chemicals so that wrong materials do not enter the construction arena putting the structures to risk.

CONSTRUCTION CHEMICALS IN INDIA

With the increase in demand for RCC structures and the government taking up large infrastructural projects the need based scope for various construction chemicals opened up in India in the later part of 1980s. Practicing engineers then, were not aware of the Construction Chemicals. It was the construction chemicals industry which had to first introduce itself and then discuss the utility and the necessity of the construction chemicals for every project. Since the construction chemicals were not specified, they were not reflected in the bill of quantities and hence not quoted for. This became an unavoidable necessity at an extra cost to the civil contractors, who would look for the most economic alternative on this extra item for which they were not going to be paid for. The knowledge about the use of right type of admixture in concrete, for the required end result comes from understanding of the concrete in depth with respect to available raw materials ingredients, type of cement used, strength and placement requirements and site condition apart from thorough knowledge of the chemistry of admixtures. Since the admixtures were not specified, the construction chemicals industry took upon itself the strenuous task of training engineering professionals into this discipline of understanding and using specific chemicals in civil construction. Today a construction chemicals professional is a practical civil engineer and a chemical engineer rolled into one irrespective of his academic qualifications. Today we see Construction Chemicals Executives moving on various sites providing solutions through their knowledge irrespective of whether they have been able to sell some product of their company or not. They help in fine tuning the concrete mix designs for achieving desired workability and strength and suggesting the precautionary measures to be exercised in achieving end results in various aspects.

INDUSTRY

Construction chemicals industry is a knowledge based industry which has got to go on evolving itself with new products, technologies and specifications to keep the construction industry going. The relationship of construction chemicals to the civil engineering industry is exactly like that of a Pharmaceutical industry to human body. Spurious and duplicate medicines are threat to the pharmaceutical industry, as well as to human life, so is the case with construction chemicals industry also. Absence of specifications, reluctance of consultants to specify construction chemicals, absence of a regulating body similar to FDA and the human tendency of contractors to pick up the most economical product available has encouraged the unorganized sector jump into this business. Today spurious integral waterproofing compounds and tile adhesives and tile joint fillers are being manufactured sold in the market by the unorganized sector in such quantities that the organized sector can hardly catch up. Unfortunately this industry is without any support from civil engineering fraternity, architects, specifiers and the government. Because of non recognition and lack of knowledge about the importance of this industry, every manufacturer is fighting his own battle with the Central Excise or Sales Tax departments, to explain the classification of the product, which is not easy anyway even for an engineer to understand. The time and energy which is thus spent could be harnessed for constructive developmental works. The role of this industry is close to that of a doctor in providing solutions to the civil engineering industry to build healthy and long lasting structures which last for years without any risk and fear.

CONCLUSION

In an effort to safeguard their interest construction chemicals manufacturers have finally been able to form an association which is CCMA (Construction Chemicals Manufacturers Association). This association is in touch with various organizations like FICCI, BIS, Architects Associations, Civil Engineering Associations, et al to get a deserved status for this industry from the government, removing mindless bureaucratic hurdles faced by this industry in its classification under Excise/Sale-Tax and to get the requisite specifications incorporated through codes and specification documents. The sensitiveness of this industry, its utility in the construction and nation building, demands that it be treated like the cement and steel industries.

REDECON 2016-Recent Developments in Design and Construction Technologies of TALL STRUCTURES -A Report



Mr. Mainak Ghosal
Consultant,
Banking & Construction Industry

With China (172) surging ahead of India (10) in super tall towers and also taking into view the “*Housing for All by 2022*” mission by Prime Minister, Narendra Modi, the Association of Consulting Civil Engineers (India) organized REDECON 2016 at NIMHANS Convention Centre, Bangalore during 9th-12th November, 2016. The international conference was inaugurated by Mr. M.Krishnappa, Minister for Housing, Government of Karnataka, deliberated on the evolution of tall structures, structural systems and the technological driving forces behind their developments. With F.S.I in India not being generally more than 3.5 in contrast to Hong Kong where less than 40 floors is not permitted, a more rational reason to challenge the limits imposed on height of structures was followed up in the Panel Discussion: ‘Tall Structures in India- Opportunities & Challenges’ which threw light on the fact that India still remains in the Planning Stage as far as Tall Structures are concerned with all its logistics lying within the framework of ‘Tall Building Draft Code of India’.

Base on today’s concrete technology, the conference sought to seek clarifications on issues such as:

Is it possible to design and produce concrete capable of attaining compressive strengths equivalent to strengths of the strongest rocks available on earth?

Is it possible to produce and pump concrete up to 600m (Burj Khalifa) and very soon up to 1000m (Kingdom Tower)? and

Is it possible to improve workability of the concrete so that vibration is not required during casting?

30 invited Papers from across the globe were presented. They included Expert Talks from the PMC’s of Burj Khalifa (Tallest Tower), One of the Main Contractors of

Petronas Towers (2nd Tallest Tower), General Manager/ Technical of Afcons Infrastructure Ltd. of Chenab Bridge (Projected to be World’s Tallest Railway Bridge). Dar al Handasah Consultants who are doing the Kingdom Tower discussed the creep effect in High Strength Concrete of 65 to 85 MPa due to addition of Silica Fumes (Micro Silica). The parallel sessions on the 3rd day contributed 37 Papers which saw deliberations on effects of replacing Micro Silica with Nano Silica. LEED and GRIHA requirements for buildings were also discussed. All these papers were subjected to through review by the technical committee and checked for plagiarism. All of the presenters were felicitated with Bouquet/Mementos. The 1st day saw Cultural Dance Programme by troupe from Nritya Kalakendra with Fellowship and Banquet while the 2nd day Cultural Programme - Hindustani Vocal Music by Smt. Poornima (Bhat) Kulkarni and Party with Fellowship and Banquet.

The Conference was supported by an Exhibition which was participated by FOSROC Chemicals, BASF India, Ultratech, Tata Steel, L & T, J K Cement, Pidilite Industries, Ramco Cements, Trimble Solutions, Penetron, Alchimica, Alufit, Wienerberger, Alfa Peb, SK Steel, Sharp Ply and many others.



Release of Souvenir & CD by Mr. M.Krishnappa, Minister for Housing, Government of Karnataka

CEAI NEWS

2 DAYS TRAINING COURSE ON FIDIC CONDITIONS OF CONTRACT

CEAI successfully conducted a FIDIC Training Course on “Practical Use and Administration of FIDIC Conditions of Contract” on 23rd & 24th August 2016 at the India International Centre, New Delhi.

The course was conducted by Mr. Bogdan Oprea, FIDIC Accredited Trainer from Romania.

The sessions were highly interactive and the delegates were satisfied with training programme. Some of the participants suggested that the duration of the training should be of 3 days instead of two days.



Mr Sudhir Dhawan, President CEAI (centre) welcoming the participants Mr. Bogdan Oprea is to his right and Mr. L D Gupta to his left.



Training Session by Mr. Bogdan Oprea in progress



Participants & Faculty - "Practical Use and Administration of FIDIC Conditions of Contract"

BCC&I INFRASTRUCTURE SUMMIT 2016 - REPORT

The “Infrastructure Summit 2016” was held at Hyatt Regency, Kolkata on the 29th September 2016 under the auspices of the Bengal Chamber, jointly with CEAI. This was the Inaugural edition of the Summit, whose principal objective is to create a platform for all stakeholders in Infrastructure development to share their views, problems and solutions in this area of supreme importance for the development of the country.



Inaugural Session of BCC&I Infrastructure Summit

The deliberations were spread over three sessions, apart from the Inaugural Session, and CEAI took charge of the session dedicated to Transport Infrastructure and arranged for all the expert speakers for this session.

The event was attended by Sri Suresh Prabhu, MIC, Railways through video link. The other dignitaries included Mr Rohit Singh, Joint Secy., MORTH, Mr V L Patankar, Director IAHE, Mr Vinayak Chatterjee, CMD, Feedback Infra, Dr Arup Roy Chowdhury, Former CMD NTPC and Dr Samarjit Chatterjee, Former President, CEAI.



Shri Suresh Prabhakar Prabhu , Hon'ble Minister, Ministry of Railways, Govt. of India is seen interacting via Video Conferencing with the President BCC&I and other Guest Speakers during the Inaugural Session

The Transport Infrastructure Session was chaired by Mr Amitabha Ghoshal, Chairman, E & NE Region, CEAI and the speakers included Mr V L Patankar, Mr Dip K Sen, Director & Sr. Ex. VP of L & T Infra and Dr Samarjit Chatterjee.

Mr Sutanu Ghosh, GC Member, CEAI and Secretary E & NE Region, CEAI, and current President of BCC&I, chaired the Inaugural Session.



View of participants at the "Infrastructure Summit 2016"

The event was well attended in all sessions by eminent members of Engineering Industry, including the Consultancy sector and proved to be a big success.

TECHNICAL LECTURES

The Institute of Management Consultants of India (IMCI) and Consulting Engineers Association of India have jointly organised the following Lectures at CEAI Centre on the topics of common interest to members.

- (a) Lecture on “The New Age Consulting Practices – Gartner” on October 22, 2016

The lecture was delivered by Mr Navin Raina, Senior Account Director – Gartner Consulting. He focused on the following key areas:

- Consulting Practices in India – A know how.
- Market Analysis of consulting needs – Industry wise.
- Need of Consultants – Prime Areas of Focus.
- What Industry needs from Consultants
- New Age Consulting – A Differentiator
- Consulting Gartner Way.

- (b) Lecture on “Need of Consulting in Education Industry – Future in Distance Education” on 5th November 2016

The lecture was delivered by Dr. Sumit Budhiraja, Director, SPD- IGNOU RC North – Largest Study Centre. He focused on the following areas:

- Need of Consulting in Education Sector
- Market Trends in Education section
- Need of Consultants – Prime Areas of Focus
- What Industry needs from Consultants
- Future of Distance Education /Remote Learning

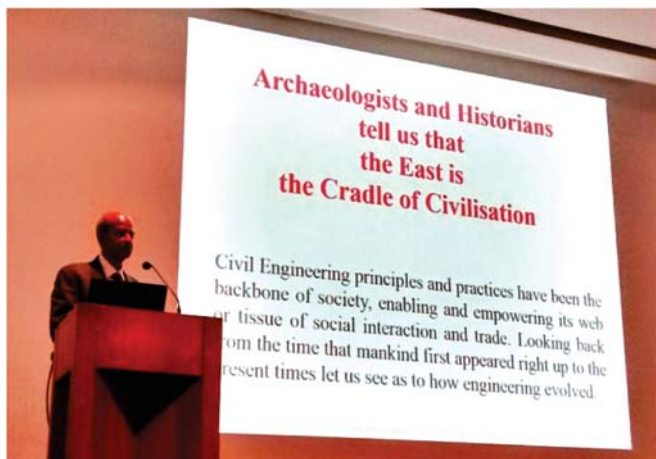
- (c) Lecture on “Innovation, Technology & Internet in Modern World” on 10th November 2016.

The lecture was delivered by Mr Siddhartha Paul Tiwari, Solutions Consultant, Google Asia Pacific, Singapore. Key focus area of the talk:

- Innovation – Need of Hour
- Technology at Drivers Seat
- Internet for Tomorrow
- Solutions for Consultants in Modern World
- Future of world with technology innovation

TALK BY MR. A. P. MULL

Mr A P Mull, Past President CEAI, delivered a talk on “Past, Present & Future of Civil Engineering in India” during the Institution of Civil Engineers’ Presidential Address programme in Mumbai on 26 August 2016.



Mr A P Mull Delivering his talk



A view of the audience

Mr. A P Mull succinctly covered the glorious past of Civil Engineering, its great present and the brighter future that awaits the current and future Civil Engineers.

He took the opportunity to talk about the legislation for engineers, apart from issues of ethics, advising the client correctly, to abide by what is technically correct and not make technical concessions since ultimately the safety and soundness is the engineer’s responsibility.

He suggested a shibboleth for the Civil Engineers in keeping with what the Vedas propound – to systematically evolve as human beings to higher levels of perfection.

Awake, Arise and Be Master Engineers

MR SUTANU GHOSH ELECTED PRESIDENT OF BCC&I

Mr. Sutanu Ghosh, a Governing Council Member, CEAI as well as Honorary Secretary of CEAI-Eastern Region Centre, was elected as President of Bengal Chamber of Commerce and Industry (BCC&I).



Mr. Ghosh is probably the first of our members to become President of a Chamber in India and that too of the oldest Chamber of Commerce.

Mr Sutanu Ghosh is Managing Director of M/s Ghosh Bose & Associates Pvt Ltd, Kolkata.

FIDIC NEWS

FIDIC 2017 YOUNG PROFESSIONALS MANAGEMENT TRAINING PROGRAMME

The 2017 YPMTP will start in February 2017 and will end with working sessions at the **FIDIC 2017 Conference**.

The 7 months course has two main elements: an online part where participants work in their office or at home using the online platform for communication, and a conference part where all participants meet for a 5-day intensive face to face training and mentoring prior to the annual FIDIC conference in September. The course is based on FIDIC principles and document standards. The basic textbook is the FIDIC guide to practice; its electronic version is provided to the participants.

The Online Sessions

The training is starting in February with 7 months online sessions where different ideas based on a real life cases are discussed. Lectures by the YPMTP Mentors are presented as well.

On a monthly basis participants meet in an online 1-2 hours classroom and present their findings and conclusions about the case work. The average time input of the programme is approximately 100 hours.

The discussions take place on a chat like platform. All discussions, lectures and classroom sessions are recorded

and saved, and may be accessed at any time during the course.

A Certificate of Successful Completion is related to the online part only and requires having responded to all case questions and attended at least half the sessions. A Certificate of Participation requires having contributed to at least half the case discussions and attended at least half the sessions.

The Conference Session

The final 5-day session involves further lectures and discussions with Mentors and among the students. Intercultural exchange based on some 30 nationalities getting together and representing a variety of approaches to the discussed management issues. An important element is the networking being the basis for future international cooperation as consultants.

The final assignment is a plenary presentation at the FIDIC conference of the teams perception of their challenges as future leaders in the consulting industry: The Future Leaders Workshop.

International Networking

More than 55 countries have participated in the course since 2004, linking up in the FIDIC Young Professionals Forum.

Optional Exam

The YPMTMP offers an optional exam based on a multiple choice test. Passing the exam will provide a Certificate enabling to claim educational points in relation to any required professional accreditation.

Additional information: FIDIC YPMTMP Coordinator, Steen Frederiksen:

Email: sf@sf-consult.dk and Online Registration at <http://fidic.org/ypmtp2017>

OTHER NEWS, VIEWS & NOTES

NEW SEMINAR /CONFERENCES

In the recent past, CEAI has expanded its outreach by way of supporting other events. Some of these are:

- (a) Indian Association of Structural Engineers - a two day Conference on "Planning and Design of Tall Buildings including Earthquake and Wind Effects" on 6th & 7th December 2016 at Lakshmiapat Singhania Auditorium, PHD Chamber of Commerce & Industry, PHD House, New Delhi.
- (b) Indian Cement Review magazine and Cement Manufacturers Association- CEMENT EXPO - 9th International Exhibition and Seminar on 8th & 9th December 2016 at the Nehru Centre, Mumbai.
- (c) ET-ACETECH hosting Pan India shows in Bangaluru, Mumbai, New Delhi & Ahmedabad between October 2016 to January 2017
- (d) SECUTECH India 2017 at Bombay Convention Centre, Mumbai on 6th to 8th April 2017.
- (e) WORLDBUILD-India event at Mumbai Exhibition Ground, Mumbai on April 20 to 22, 2017.
- (f) Municipalika Smart and Sustainable Cities, 14th International Exhibition and Conference on Smart and Sustainable City Solutions, 18th to 20th May 2017, at CIDCO Exhibition Centre, Navi Mumbai.
- (g) 10th World Aqua Congress 2016 from 24th to 25th November 2016 at India Habitat Centre, Lodhi Road, New Delhi 110003.



Eco Friendly

Solution For The Construction Industry



- Integral Water Proofing Compounds
- Surface Applied Water Proofing Coatings
- Tile Fixing Adhesives And Joint Fillers
- Structural Repair Products
- Bonding Agents
- Plasticisers
- Flooring Products & Industrial Coatings



Water Proofing Systems



Tiling Aids



Repair and Bonding Agents



Admixtures for Concrete



Epoxy Coating & Protection Systems



Construction Aids

All you need in civil engineering applications

AN ISO 9001 : 2008 & NSIC - CRISIL SME 2 RATED COMPANY

Member of Construction Chemicals Manufacturers Association



PERMA CONSTRUCTION AIDS PVT. LTD.

611 / 612, Nirmal Corporate Centre, Mulund (W) Mumbai - 400 080, India.

Tel.: 91-22-2591 8911 / 2567 4690 • Fax : 2590 3008

E-mail: info@permaindia.com • Visit us at www.permaindia.com/.net



Member - CCMA



Consulting Engineers Association of India

CEAI Centre, OCF, Plot No.2, Pocket 9, Sector B, Vasant Kunj, New Delhi 110070
Tel.: 91-11-26134644 Telefax: 91-11-26139658
E-mail: info@ceai.org.in, ceai.ceai@gmail.com, Website: www.ceai.org.in