Twenty Five Years of Engineering Excellence
1994-2019
25 years
Belapur Local Centre

The Institution of Engineers (India)

Belapur Local Centre

Plot No. 106, Sector-15, CBD Belapur, Navi Mumbai, Maharashtra-400614.
Phone : 022-27579935 | Email : belapurlc@ieindia.org
www.ieiblc.org

Silver Jubilee Year Souvenir !

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About Belapur Local Centre

The Council of IEI set up Belapur Local Centre (BLC) in May 1994. Ever since its inception, BLC is vibrant with active participation from its office bearers and ever increasing members. BLC is situated in a 1000 Sq. Meters plot in Sector 15, Central Business District (CBD), close to Belapur Railway Station in Navi Mumbai. BLC Building was designed by the reputed architects, M/s. Shashi Prabhu & Associates and M/s. Sopan Parbhu Architect. It consists of stilt with 5 floors at estimated cost of Rs.100 lakhs (as of 1994). Building work has been executed in phases, largely due to benevolent corporate funds in addition to contributions from members and assistance from various agencies. At present, IEIBLC has 3687 members comprising of engineers from 15 Divisions (Civil, Mechanical, Electrical, ET, Computer Engg, Architecture, Mining, Textiles...).

These high profile engineers are from Thane, Raigad, Navi- Mumbai, Ratnagiri, Sindhudurg etc. BLC organizes series of lectures, speeches, workshops, seminars, symposia etc., to disseminate knowledge and create a platform for exchange of technical ideas between members, non members, with participation of a number of leading companies and organiszations.

BLC is active in organizing Seminars Guest Lectures and Workshop, Guidance Classes for AMIE Examination, Support to Student Chapters for conduction of Various Activities, Industrial Visits, National Level Seminars under Divisional Board Activities, Publication of Quarterly Newsletter.

Facilities at BLC

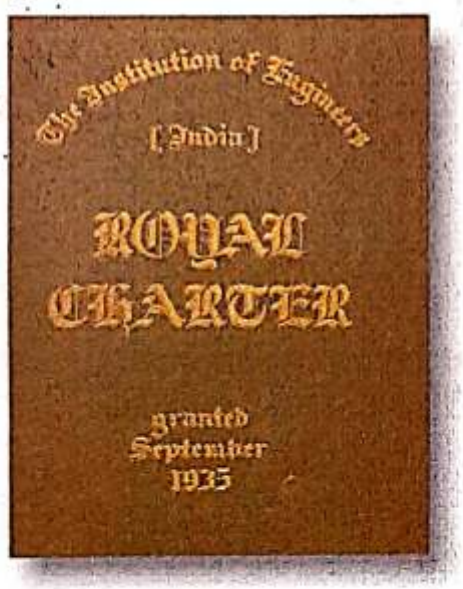
1. NABL Accredited Material Testing Laboratory
2. Computer Centre
3. AMIE Guidance Classes
4. Well Equipped Consultancy Room
5. Library and Reading Room (Capacity of 60)
6. Well Equipped Auditorium (Capacity of 110)
7. Conference Room
8. Well Furnished Guest House

MSC Managing Committee Meeting

AMIE Examination Centre

The Institution of Engineers (India)

8 Gokhale Road, Kolkata 700 020, West Bengal, India



ROYAL CHARTER

At the Court at Buckingham Palace

Bharat Ratna Sir M Visvesvaraya

The largest professional body of engineers in India providing a vast array of technical, professional and supporting services to the government and industries along with the academic and engineering communities

Acting as the qualifying body and conducting examinations to cater to the needs and aspirations of prospective entrants to the engineering profession

Providing access to R&D activities and engineering practices through engineering and technological disciplines

Focusing on new developments, techniques, products, processes and other issues of topical interest

Established in the year 1920 and Incorporated by Royal Charter in 1935

ISO 9001:2008 Certified

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The Institution of Engineers (India)
(ESTABLISHED 1920, INCORPORATED BY ROYAL CHARTER 1935)
Headquarters : 8 Gokhale Road, Kolkata - 700 020, India
Website : http://www.ieindia.org
A Century of Service to the Nation

Er. Narendra Singh, FIE
President

MESSAGE

I am happy that Belapur Local Centre of The Institution of Engineers (India) is celebrating its Silver Jubilee Year on 28th February 2020 at Belapur.

The Centre has been operating with zeal and competence for past 25 years in service of engineers & engineering profession and serving the engineering fraternity with aplomb. When we pause at this important juncture to reflect on achievements, the Centre would recommit itself for more vibrant and meaningful services for the profession.

I convey my hearty greetings to all members attached to the Centre and wish the celebration a grand success.

Er. Narendra Singh
FIE

Office : H No. 9/14, Mahant Flat, Idgah, Chakrata Road, Dehradun 248 001
Telefax: 0135-2620049, Mobile : 9412051590, E-mail : president@ieindia.org / nsinghfieindia@rediffmail.com

The Institution of Engineers (India)
AN ISO 9001 : 2008 CERTIFIED ORGANISATION
(ESTABLISHED 1920, INCORPORATED BY ROYAL CHARTER 1935)
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http://www.ieindia.org

Dr T M Gunaraja, FIE
Immediate Past President

Ph : +91-33-40106204

A Century of Service to the Nation

Dr. T. M. Gunaraja
Imm. Past President

MESSAGE

Completion of 25 years of any institution is a significant signpost for which any one can be proud of. Belapur Local Centre of the Institution has achieved this coveted landmark.

The Centre and its worthy members can look forward to still greater professional achievements in the service of engineering fraternity and engineering profession. If past is any indication, the future would be full of opportunities and I am sure that the Centre would better its own achievements in years to come.

I congratulate all members of the Centre at this proud moment and wish the Silver Jubilee celebration a grand success.

(Dr T M Gunaraja)

No.2AB, KENCES ENCLAVE, No.1, Ramakrishna Street, North Usman Road, T Nagar, Chennai 600 017
Ph: 044-28143408, Mob: +91-9444026120 / 9884626120, E-mail: tmgraja@live.in

The Institution of Engineers (India)

AN ISO 9001 : 2015 CERTIFIED ORGANISATION
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Maj Gen (Dr.) S Bhattacharya, VSM (Retd)
Secretary & Director General

Ph. Direct : (91) (33) 2223 8230
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E-mail : sdg@ieindia.org

A Century of Service to the Nation

Maj Gen (Dr.) S Bhattacharya,VSM (Retd)
Secretary & Director General

MESSAGE

It is indeed a pleasure to note that Belapur Local Centre has completed 25 years of service to the engineering fraternity. I would like to congratulate the members of the Centre through whose contribution, the Centre has reached this significant milestone and made possible its development over the years.

I am happy that a souvenir is being brought out to commemorate the Silver Jubilee of Belapur Local Centre on 28 February 2020.

I am sure, Belapur Local Centre would forge ahead to enhance its activities with renewed vigour.

MAJ GEN S BHATTACHARYA, VSM (RTD)

The Institution of Engineers (India)

(Established 1920, Incorporated by Royal Charter 1935)

MAHARASHTRA STATE CENTRE

15, Haji Ali Park, K Khadye Marg, Mahalaxmi, Mumbai – 400 034.

Dr. Mohan Balwant Dagaonkar
Council Member

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Email : maharashtrasc@ieindia.org
Website : www.ieimaharashtra.org

A Century of Service to the Nation

Date: 12.02.2020

Dr. Mohan Balwant Dagaonkar
Council Member, Maharashtra State
The Institution of Engineers (India)

MESSAGE

It is a great year for all members of Belapur Local Centre in general and for me in particular as Centre has completed a successful journey of 25 years and we are celebrating Silver Jubilee Year on 28th February, 2020.

Since the inception of belapur local Centre, it has conducted lots of Technical Activities in the form of Seminars, Workshops, Conventions, Student Activities, involving Industry and Academia participation in various programmes.

I am hopeful that the Centre will take these Activities to a greater height in coming years.

I wish the Silver Jubilee Function a great success.

Dr. Mohan Balwant Dagaonkar

IEI Head Quarters
8, Gokhale Road, Kolkata – 700020.
Phones : +91-33-2223 8311/14/15/16/34 * Facsimile : +91-33-2223 8345 * Web : http://www.ieindia.org * Gram : ENJOIND

The Institution of Engineers (India)

[Established : 1920 - Incorporated by Royal Charter : 1935]

MAHARASHTRA STATE CENTRE

15, Haji Ali Park, K. Khadye Marg, Mahalaxmi, Mumbai 400 034.

Dr. Himanshu Madhukar Raje, FIE
Chairman

Shri. Narendra K. Birar, FIE
Honorary Secretary

Telephones : +91-022-2354 2943
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Fax : +91-022-2354 2942
E-mail : maharashtrasc@ieindia.org
Web-site : www.ieimaharashtra.org

"99 Years of Relentless Journey Towards Engineering Advancement for Nation Building"

10th February, 2020.

To
The Honorary Secretary
The Institution of Engineers (India)
Belapur Local Centre.
Plot No: 106, Sector 15, C B D Belapur
Navi Mumbai 400 614

Message

It has given me immense pleasure that IEI Belapur Local Centre is going to celebrate the programme for its Silver Jubilee Year on 28-02-2020.

Needless to say that engineering and technology are changing very fast, nobody can survive without upgrading his technical knowledge. In these hard days, when recession is looming, engineers should be very much careful to upgrade the productivity.

Since the inception in 1994, Belapur Local Centre has performed a series of laudable activities, such as, Seminars, Workshops, Lecture Programmes which acted as knowledge sharing activities amongst IEI Members, Industry Professionals and Technocrats. This centre also tried to make itself a hefty Centre among all the Local Centres of IEI.

I once again congratulate all the committee members of IEI Belapur Local Centre for organizing the Silver Jubilee Celebration and wish the programme a grand success.

Thank you all.

(Dr. H M Raje)
Chairman, IEI
Maharashtra State Centre

IEI HEADQUARTERS
8, Gokhale Road, Kolkata 700 020
Telephones : + 91-33-2223 8311/14/15/16/34 *** Facsimile : + 91-33-2223 8345 *** Web : http://www.ieindia.org *** Gram : ENJOIND

The Institution of Engineers (India)

(Established 1920, Incorporated by Royal Charter 1935)

Er. K. K. Varkhedkar FIE
Chairman

Dr. S. C. Nimkar MIE
Hon. Secretary

BELAPUR LOCAL CENTRE

Plot No.106,Sector-15, C. B. D. Belapur,
Navi Mumbai - 400 614.

Tel.: 022-27579935
Email : belapurlc@ieindia.org
Web. : www.ieiblc.org

"100 Years of Relentless journey towards Engineering Advancement for Nation-building"

Date: 16.02.2020

Er. Keshav K. Varkhedkar
Chairman, Belapur Local Centre,
The Institution of Engineers (India)

MESSAGE

It is heartening to note that Belapur local Centre of The Institution of Engineers (India) is celebrating Silver Jubilee of its formation on 28th of February of this year. This is also the Centenary year of our Sacred Institution.

I am fortunate to be the Chairman of this local Centre during this Silver Jubilee Function. Belapur local Centre has remained vibrant since its inception. It has held innumerable Seminars, Workshops and Conventions on the subjects of engineering importance.

The Centre has established NABL Accredited Material Testing Laboratory and Engineering Library for the benefit of engineering fraternity.

Over the period Belapur Local Centre has established effective link between Industry, Academicians and Students. This link has enabled us to perform our responsibility of dissemination of knowledge successfully among various stake holders.

Centre has planned for various educational programmes in the near future for the benefit of Engineers and we are sure to take them to logical conclusion with the support of all our members.

I extend my best wishes to all on the occasion of this great event and seek continued support of our members in future also.

Keshav K. Varkhedkar

Editorial

Vijay C. Kamble, FIE
Editor

I have been honored with this prestigious task of preparation of Souvenir of The Institution of Engineers (India), Belapur Local Centre (IEI BLC) on the momentous occasion of Silver Jubilee Year Celebration.

All are aware that the Belapur Local Centre is a vibrant centre of The Institution of Engineers (India). The Centre has established in the year 1994 with the great support of the then Managing Committee Members of the Maharashtra State Centre especially Mr. N. D. Patel, Past Chairman, MSC & Mr. S. R. Hosalkar, Past Chairman, MSC & Mr. K. N. Majumdar, S.D.G. The IEI. The main objective of formation of this centre is to cater the demand of the Engineering Professionals working in the area of Thane District, Navi Mumbai and Konkan Region, who were not able to approach the Maharashtra State Centre for Participating in the Technical Activities of the Institution.

The Belapur Local Centre has started with the genuine and strong involvement of Senior Engineers of CIDCO especially Mr. S. G. Pingle, Mr. R. K. Jha, Mr. A. B. Karweer, Chief Planner, Mr. Gogate, Mr. P. S. Ambike and many more. The inception of the Centre was done at the Site Office of the Vashi Railway Station of CIDCO. Since inception the Centre remained vibrant by organising different Technical Activities. I remember the Competitions organized by the Centre like “Best S.T.P. in Thane and Navi Mumbai Area”, “Best Commercial Building”, “Best Social Facility Building / Complex”, “Best Residential Housing Complex” in the jurisdiction of Centre etc. and the prizes were awarded on the occasion of Engineers Day Celebration. Since then, the journey began and the momentum is still continuing.

Regarding developing Own Premises of the Institution, I would like to share the story behind the purchase of Plot. CIDCO, a Planning and Developing Authority of Navi Mumbai had kept reservation of plots for Institutions. The planning of the plots was being done by Planning Department of CIDCO. There were requests by many Institutions for allocation of plots; amongst them, one of the Institutions was Institute of Planners & Architects and another was The Institution of Engineers (India). The Planning was in the hands of Planners & Mr. Gogate, Chief Architect & Planning of CIDCO honored the request of Mr. S. G. Pingle, Chief Engineer & G. M. (Tech) Mr. R.K. Jha C.T.C.P. and then Superintending Engineer Mr. A. B. Karweer and allotted the Main Road facing Plot at prime location to The Institution of Engineers (India), on which the present premise is standing with pride.

With the great support of Senior Engineers of CIDCO and then Chairman of BLC, building was completed upto 3rd floor with the generous donations from the Well-Wishers, Contractors and Engineering Professionals and also with the valuable financial support of Maharashtra State Centre who gave Rs. 8.0 lakhs as a loan, which we have returned. Subsequently, remaining floors upto 5th floor including terrace were developed with incredible support from Mr. M.B. Dagaonkar, then Chairman, Belapur Local Centre.

Over the period Belapur Local Centre has established effective link between Industry, Academicians and Students. To fulfill its Aims & Objectives, Belapur Local Centre conducts Lectures, Seminars and Workshops on different subjects of the various Engineering disciplines and organizes National Conventions etc. with the mission to disseminate technical knowledge amongst the Engineers, to keep them updated with the latest development in the field. We also promoted to start Students Chapters in the Engineering Colleges, Polytechnics and conduct Technical Activities for shaping the technical career of the young budding Engineers.

In this journey of 25 years of relentless service of The Institution of Engineers (India), Belapur Local Centre, many hands came forward to help the Organization in different ways, by direct help or through advertisements, which may be in the form of Tan - Man - Dhan (Physically – Mentally – Financially). We, with humble gesture acknowledge their incredible contributions and remain oblige in their noble deeds.

I also acknowledge the support of all the Chairmen, Hon. Secretaries, Managing Committee Members – Past and Present, Council Members of IEI, Maharashtra State Centre, Belapur Local Centre and Other Centres, who contributed with pure heart for keeping the Belapur Local Centre always in forefront.

I acknowledge the efforts of Dr. M. B. Dagaonkar, Council Member, The IEI, Mr. K. K. Varkhedkar, Chairman, BLC, Mr. N. P. Chaudhari, Past Hon. Secretary, Dr. Samir Nimkar, Hon. Secretary, Mr. Jaswant Mistry, Imm. Past Chairman, Mr. S. P. Singh, Imm. Past Hon. Secretary, Mr. P. N. Tandon, Past Chairman, Mr. R. K. Modi, Past Chairman, BLC and Mr. Sarjerao Pawar, Printer for putting in all their valuable contribution to make this Souvenir a collector's document with excellent quality.

I am glad to present this Souvenir, which gives kaleidoscopic spectrum of the technical knowledge from different engineering disciplines, information about The Institution of Engineers (India) and legacy of the Belapur Local Centre and much more.

Many Thanks & Regards!

Vijay C. Kamble, FIE
Editor,
Member, Environment Division, IEI MSC,
Past Hon. Secretary & Past Chairman, IEI BLC

Navi Mumbai.
28th February, 2020.

From Secretary's Desk

Dr. S. C. Nimkar MIE
Hon. Secretary

The Institution of Engineers (India) is celebrating its 100th year and Belapur Local Center (BLC) is celebrating its 25th year in 2020. The Council of IEI set up Belapur Local Centre (BLC) in May 1994. Ever since its Inception, BLC is vibrant with active participation from its office bearers and ever increasing members. BLC is situated in a 1000 Sq. Meters plot in Sector 15, Central Business District (CBD), close to Belapur Railway Station in Navi Mumbai. BLC Building was designed by the reputed architects, M/s. Shashi Prabhu & Associates and M/s. Sopan Parbhu Architect. It consists of a stilt with 5 floors at estimated cost of Rs.100 lakhs (as of 1994). Building work has been executed in phases, largely due to benevolent corporate funds in addition to contributions from members and assistance from various agencies. At present, BLC has over 3600 members comprising of engineers from 15 Divisions (Civil, Mechanical, Electrical, ET, Computer Engg, Architecture, Mining, Textiles...). Our member represents various disciplines of engineering which makes IEI a multidisciplinary functioning organization. These high profile engineers are from Thane, Raigad, Navi-Mumbai, Ratnagiri, Sindhudurg etc.

Our local center building with lift and power backup facility is located at the prime location in Navi Mumbai which enables easy access to all members. We are also having guest room facility which can be availed by all members at nominal rate. BLC is having well equipped library and reading hall where variety of technical books, reference books are available with library management software. For large gathering we are having AC auditorium with capacity of 110 people. Consultancy rooms are newly constructed on the second floor to facilitate various consultants and organizations to hold meetings with their clients at very nominal rate. We have completed the structural audit and Electrical work of our building. We have also installed roof top solar system of capacity 28 kW for our building with capital expenditure of 13 lakhs. BLC is conducting Exams for AMIE Section A and Section B since eight years. To maintain the required standard of AMIE Examination, the exams are conducted at Bharati Vidyapeeth Institute of Technology, Kharghar Navi Mumbai. Exams are conducted under the surveillance of Chairman, Council Member and Committee Members in addition to CCTV camera in exam rooms. To help the students for their examination AMIE section -A guidance classes are also conducted.

Our NABL accredited Material Testing Laboratory is becoming helpful for various construction companies to check quality of their material. CAD center of the institution is conducting various courses like BIM modeling, ETABS, SAFE2, MIDAS Civil etc. BLC organizes series of lectures, speeches, workshops, seminars, symposia etc., to disseminate knowledge and create a platform for exchange of technical ideas between members, non-members, with participation of a number of leading companies and organiszations. It gives me immense pleasure to acknowledge the overwhelming response for all the technical activities conducted at BLC.

With Regards.

Dr. Samir C. Nimkar
Hon. Secretary

List of Past Chairman & Hon. Secretary

Year	Chairman	Hon. Secretary
1994-1996	Shri. S. G. Pingle	Shri. A. B. Karweer
1996-1998	Shri. R. K. Jha	Shri. A. B. Karweer
1998-2000	Shri. A. B. Karweer	Shri. R. P. Yaul (1998-1999) Shri. S. C. Deshpande (1999-2000).
2000-2002	Shri. S. C. Deshpande	Shri. S. S. Chaudhari
2002-2004	Shri. P. S. Ambike	Shri. G. L. Chopra
2004-2006	Shri. S. S. Chaudhari	Shri. A. S. Patil
2006-2008	Dr. A. R. Katti	Shri. R. J. Giri
2008-2010	Dr. M. B. Dagaonkar	Shri. N. P. Chaudhari
2010-2012	Shri. R. K. Modi	Shri. V. C. Kamble
2012-2014	Shri. V. C. Kamble	Shri. P. N. Tandon
2014-2016	Shri. P. N. Tandon	Shri. J. N. Mistry
2016-2018	Shri. J. N. Mistry	Shri. S. P. Singh

The Institution of Engineers (India)

Belapur Local Centre

Managing Committee Members 2018-20

Sr. No.	NAME	POSITION	DIVISION
1	Mr. K. K. Varkhedkar	Chairman & Council Member	Civil
2	Dr. Samir. C. Nimkar	Hon. Secretary	Chemical
3	Dr. M. B. Dagaonkar	Council Member, MSC	Civil
4	Dr. H. M. Raje	Chairman, MSC	Civil
5	Mr. N. K. Birar	Hon. Secretary, MSC	Civil
6	Mr. J. N. Mistry	Immediate Past Chairman	Civil
7	Mr. S. P. Singh	Immediate Past Hon. Secretary	Mechanical
8	Mr. V. C. Kamble	Member, MSC	Environment
9	Ms. Deepa P.	Member	Chemical
10	Dr. K. M. Godbole	Member	Civil
11	Mr. S. R. Bagul	Member	Civil
12	Ms. S. M. Dagaonkar	Member	Civil
13	Mr. V. M. Rathod	Member	Computer
14	Mr. A. S. Maindalkar	Member	Electrical
15	Mr. Indranil Ghosh	Member	Electrical
16	Mr. S. S. Singh	Member	Electronics & Telecom
17	Mr. P. M. Shrivastav	Member	Mechanical
18	Mr. G. P. Jauhari	Member	Mechanical
19	Mr. S. V. Kanatute	Member	Mechanical
20	Mr. S. S. Desai	Member	Production
21	Cdr. Dr. B. M. Bhandarkar	Member	Marine
22	Mr. S. A. Nadgauda	Member	Civil
23	Mr. N. P. Chaudhari	Member	Environment
24	Mr. P. G. Narwelkar	Member	Computer
25	Mr. C. Bose	Member	Textile

From Left 1st Row - Ms. Deepa P., Mr. Sharad Kantute, Mr. J. N. Mistry, Mr. A. S. Maindalkar, Mr. S. R. Bagul, Mr. V. C. Kamble, Mr. N. P. Chaudhari, Dr. K. M. Godbole, Ms. S. M. Dagaonkar

From Left 2nd Row - Mr. S. S. Singh, Mr. V. M. Rathod, Mr. S. S. Desai, Mr. P. N. Tandon, Dr. S. C. Nimkar, Dr. M. B. Dagaonkar, Mr. K. K. Varkhedkar, Cdr. Dr. B. M. Bhandarkar, Mr. S. P. Singh, Mr. P. M. Shrivastav, Mr. P. G. Narwelkar

Facilities

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The Institution of Engineers (India)

Belapur Local Centre

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The Institution of Engineers (India)

Belapur Local Centre

AWARDS

Category : Industry

Sr. No	Name of Industry	Award Category
1	M/s. Sandvik Asia Pvt. Ltd, Lote unit	Energy Conservation
2	M/s. Zara Personal Care , Khopoli Pvt. Ltd, Mumbai	Product Development
3	M/s. Sunanda Speciality Coatings	Product Innovation
4	M/s. Tata Steel BSL Ltd. Khopoli	Process and Productivity Improvement
5	M/s. B.G. Shirke Construction Pune Technology Pvt. Ltd.	Mass Housing Project
6	M/s. J. Kumar Infraprojects Ltd.	Open Web Girder for Navi Mumbai Metro Rail Project

Category : Startup

Sr. No	Name of Entrepreneur	Name of Startup
1	Er. Kshitij Thakur	Occipital Tech
2	Er. Himanshu Arora	Baggagi.AI
3	Er. Aditya Vermani	Clairviz

Students Project Awards

Sr. No.	Name of Project	Name of Institute	Category	Name of Students
1	Design & Development of Laser Wall Systems	Fr. Rodrigues Institute of Technology, Vashi	Mechanical Engineering Degree (First Prize)	1.Jerom Fernando 2.Shenon Gunapally 3.Poorva Khare 4.Ajith Nair
2	Plastic Recycling machine compression moulding	Terna Engineering College, Nerul	Mechanical Engineering Degree (Second Prize)	1.Ninad N. Mhatre 2. Akhilesh R. Garud 3. Adesh S. Khedekar 4.Praful M. Pawar
3	Swarm Robotics in Disaster Management	Fr. C. Rodrigues College, vashi	Computer Engineering Degree (First Prize)	1.Felix Biju 2.Jithin Jose 3.Sibi Biju 4.Leah Abraham
4	Precision time management with an accuracy of sub-nanoseconds in between collision	Fr. C. Rodrigues College, vashi	Computer Engineering Degree (Second Prize)	1.Tanish Mittal 2. Gyandip Mallhi 3.Devashree Tike 4. Anoop Panickar
5	Cocopeat as a Biofilter in Rubber Compounds	Shivajirao Jondhale College of Engg., Dombivali	Chemical Engineering Degree (First Prize)	1.Kartik V. Savla 2.Pranali L. Kandkar 3.Shamali A. Thakur
6	Real time slope failure prediction system	Universal College, Vasai	Civil Engineering Degree (First Prize)	1.Pritesh J. Mewada 2.Sakshi V. Singh
7	Assessment of watershed develop ment program work in Anari Village, Chiplun	Gharada Institute, Khed	Civil Engineering Degree (Second Prize)	1.Bhandari Sahil Avinash 2.Khetale Abhishek Ashok 3.Jadhav Omkar Suresh 4.Pawar Jyoti Gajanan
8	Design and development of wide bandwidth power quality analyzer	Fr. C. Rodrigues College, Vashi	Electrical Engineering Degree (First Prize)	1.Aboh Nagocha 2.Anish Kamse 3.Ashutosh Kavitkar 4.Kunal Kulkarni
9	Remote Online Monitoring of Electric machine using IoT	Fr. C. Rodrigues College, Vashi	Electrical Engineering Degree (Second Prize)	1.Mohit Patil 2.Mohit Patel 3.Pranav Kulkarni 4.Sharun Shibi
10	Augmentative & Alternative Communication Device	Fr. C. Rodrigues College, Vashi	Electronics & Telecommunication Engineering Degree (First Prize)	1.Shan Nikhil Milind 2.Fernandes Joyrin 3.Fatani Rahul P.

Students Project Awards

Sr. No.	Name of Project	Name of Institute	Category	Name of Students
11	Autonomous Multi terrain Modular Drone	Fr. C. Rodrigues College, Vashi	Electronics & Telecommunication Engineering Degree (Second Prize)	1.Valliyakakara Jetin 2.Konnur Harsh 3.Subhashish Bhattacharya 4.Akanksha Sharma
12	Anti-Social Application	Pravin Patil College Bhayandar	Computer Engineering (First Prize)	1.Raj Sangani 2.Pratiksha Choudhari 3.Sharmishtha Sawant 4.kamlesh Kawade
13	Smart Plant Communicator	Pravin Patil College Bhayandar	Computer Engineering Diploma (Second Prize)	1.Junaid Shaikh 2.Badal Vishwakarma 3.Himanshu Kumar 4.Saniya Kadri
14	Server Cooling System	Pravin Patil College Bhayandar	Electronics & Telecommunication Engineering (First Prize)	1.Mishra Kuldeep 2.Naik Rahul 3.Akash Gaikwad 4.Vais\h Satyam
15	All Weather Solar Panel	Pravin Patil College Bhayandar	Electrical Engineering Diploma (Second Prize)	1.Amol Paleykar 2.Vishal gupta 3.Prateek Singh 4.Adarsh Mishra
16	Solar Tree	Anjuman –E-Islams A.P.Kalsekar Polytechnic, Panvel	Mechanical Engineering (First Prize)	1.Pranay Patil 2.Md. Rizwan 3.Md. Ameen 4.Arbaz Mulla
17	Purification of drinking water with the application of naturally available resources	Pravin Patil College Bhayandar	Civil Engineering (First Prize)	1.gitanjali Gaikar 2.Sufyan Shaikh 3.Shreyas Waghmare 4.Tejal Mukare
18	Modern Techniques of Tracks	Pravin Patil College Bhayandar	Civil Engineering Diploma (Second Prize)	1.Aarthi Mahalakshmi 2.Asmita Pagdhare 3.Divyani Kotwl 4.Rupali Mane
19	Magnetic Drum separator	Bharati Vidyapeeth Institute of Technology, Navi Mumbai	Chemical Engineering Diploma (First Prize)	1. Hitanshu Mehata
20	Gasification of Coal	Bharati Vidyapeeth Institute of Technology, Navi Mumbai	Chemical Engineering Diploma (Second Prize)	1.Sahil Siddique

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Navi Mumbai City - An Overview

Dr. Mohan Balwant Dagaonkar, FIE

In sixties, concept of forming a new city on mainland across the Thane Creek emerged. This idea of developing a new city came to decongest Mumbai City. Mumbai was and even today, is a great magnet for the citizens of India for a bright future and promising career. It is a hub of all cultural, Economic, Industrial, Medical activities. The great Bollywood is also at Mumbai. To accommodate the ever-growing population and reduce the burden on the existing infrastructure it was felt by the planners and eventually politicians to decongest the Mumbai City and create a new self-sufficient city across the Thane Creek that is Navi Mumbai.

After all due government procedures in the year 1970, City and Industrial Development Corporation of Maharashtra Limited (CIDCO) was established as new Special Planning and Development Authority with power of Government of Maharashtra to acquire the land of 95 villages and plan and develop New Bombay (Now Navi Mumbai)

CIDCO with due diligence started the procedure of making a new city. Planners of CIDCO envisaged a well-planned city, which would have been a First Largest Plan City of India after Independence.

Planners and Engineers planned city with all the norms of land use with infrastructure like Social, Physical and Transport Network and services like Water, Sewerage, Health & Education, and Cultural etc.

The development took place node wise and population increased with the pace of development of these nodes. CIDCO continued to provide Civic Services to the Citizens till the Municipal Corporation established. As to provide Civic Services is job of Municipal Corporation subsequently, Navi Mumbai Municipal Corporation was in the year 1992 and Panvel City Municipal Corporation formed in the year 2016 for the developed nodes from Airoli to Panvel.

Though CIDCO has planned this city as per International Standards in a well-mannered but due to ever-growing population and change in lifestyle of citizens due to global trend and in a change economic patterns the city now faces inadequacy of affordable housing, Parking Facilities, Water Scarcity, Public Transportation, Traffic Congestion and Clean and green Environment.

Today, Navi Mumbai has emerged a modern and well planned city in the country. It has got rank No. 07 cleanest city in the India and 1st in the State of Maharashtra. It has also ranked No. 2 in Standard of Livable Cities.

But, to remain a well-planned and livable City it needs to address above issues of Public Transportation, Traffic Congestion on the road, Hawkers Problem, Air Pollution, Water Availability, affordable housing and increasing population density.

Belapur Local Centre of The Institution of Engineers (India) can play a major role by involving our well qualified and experienced members in drafting policies and advising the concern authorities for betterment of Navi Mumbai city.

——— ⋆ ⋆ ⋆ ———

[Author is Council Member of The Institution of Engineers (India) and former City Engineer / Additional Commissioner of Navi Mumbai Municipal Corporation]

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N. Venkateswaran
Chief Executive Officer

Affordable Housing - Navi Mumbai Scenario

Er. K. K. Varkhedkar, FIE
Ex. Chief Engineer, CIDCO Ltd.
& Chairman, IEI BLC

BACKGROUND :

India is rapidly urbanising Country facing development challenges associated with rapid growth. The biggest challenge, any developing nation faces, is the urban migration. India is also passing through the same phase. The high percentage of labour migration from Rural areas to Cities has contributed to urban congestion, pressure on basic amenities such as water, sanitation etc. and above all severe Housing shortage across the cities in India. The Government is estimating an overall housing shortage of 20 million units as on date and surprisingly 95% of which are in Economically Weaker Sections and Low Income Group Segments.

The Urban Housing shortage is expected to touch mind boggling figure of 300 million by 2022. The ever increasing gap between demand and supply of housing stock is forcing people to stay in slum areas. The issue if not dealt with all seriousness at this stage will have serious implications on the economic growth of the country and also poverty alleviation program.

One of the reasons for wide gap between demand and supply of affordable housing is due to fact that the capacity addition for housing stock has been going on in the segments which are beyond the reach of EWS & LIG customers. Real Estate Developers and Private Players are focusing on these upper level segments, due to huge returns. On the other hand, high land cost, increasing raw material cost and low profit margin have made the Low Cost Housing Projects less attractive.

It is essential that there should be robust and sustainable collaboration between Central Government Ministries, State Governments, Urban Local Bodies and Private Players to build up India's Affordable Housing Program successfully.

While planning an Affordable Housing Scheme, a key aspect that has been widely neglected is a recurring maintenance expenditure, post handover of the units to the intended beneficiaries / customers. This eventually creates new Urban Slums and defeat the very purpose of creating these assets. Government of India, in last few years, has taken many concrete steps to boost the Affordable Housing Sector; but lot of challenges still remain. Most of the State Governments have also realised the gravity and seriousness of the situation and have taken concrete steps to tide over this situation.

THE STEPS TAKEN BY GOVT. OF MAHARASHTRA

The steps taken by Government of Maharashtra through its entity CIDCO Ltd, to increase the stock of Affordable Housing in Navi Mumbai are elaborated herewith.

CIDCO Ltd. i.e. City & Industrial Development Corporation of Maharashtra Ltd. is fully owned company by Government of Maharashtra. A Committee was appointed by Government to study the impact of ever increasing population of Mumbai in 60's. The Committee was also directed to suggest remedial action plan for de-congestion of Mumbai. The Committee in its report suggested to develop an Alternative City across Thane creek for achieving the stated objective of decongestion of Mumbai. The idea of development of City across Thane creek was conceptualised and finalised thereafter and New City was named as Navi Mumbai.

ROLE OF CIDCO LTD.

CIDCO was entrusted with the responsibility of development of this New City. Since its inception CIDCO has discharged its social obligation to create Affordable Houses for Economically Weaker Sections, diligently. The presence of CIDCO in housing sector has rendered a stabilizing effect on the pricing. Out of the total tenements of 1,28,390, constructed by CIDCO, as on date more than 50% have been built for EWS and LIG category.

There has been tremendous demand for CIDCO's Housing Schemes over the years due to the following advantages it offers to the buyers/ consumers:

1. Higher Area than that in the Private Scheme.
2. Transparency in Pricing Structure.
3. All regulatory norms of the Government / Local Bodies are observed true to their spirit.
4. Mandatory Codal provisions are adhered scrupulously while execution.
5. Assurance of timely completion.
6. Simplified payment terms and conditions.
7. Subsidised land pricing so as to reduce sell price.
8. Assurance of getting promised amenities.

ACTION BY CIDCO:

CIDCO now has embarked on an Ambitious Housing Program under PMAY Scheme; where approximately 1,10,304 nos. of tenements are being constructed. The projects have taken off at the different locations of Navi Mumbai at a total cost of Rs. 22,000 Crores approximately and proposed to be completed by March, 2023. CIDCO's own finances will be used initially for these works; however CIDCO also intends to start marketing of these projects; so that accrual of sale proceeds will start simultaneously and its own finances will not be blocked up for a long period.

Renowned Construction Agencies have been engaged for the development of these schemes within specified time limit and with desired quality. The housing schemes have number of Green Building Initiatives such as LED Lights for Common Areas, use of Solar Energy, Rain Water Harvesting, Provision of Organic Waste Convertors in all Societies and also Recycling & Reuse of Treated Sewage.

To take care of maintenance expenditure, post handover of these housing schemes to the beneficiaries, it has been decided to carry out the maintenance for the period of two years by the CIDCO only and pricing will be worked out to take care of the maintenance expenditure also. Special clause has been inserted in the tender documents accordingly.

CIDCO, as an agent of Government of Maharashtra, has been very proactive in discharging its obligation for the creation of Housing Stock for the Economical Weaker Sections of the Society and it is expected that Other State Governments and their Agencies may follow the example of CIDCO, in this regard.

★ ★ ★

Courtesy : CIDCO LTD.

NAVI MUMBAI METRO RAIL PROJECT

Dr. K. M. Godbole, FIE
Chief Engineer, CIDCO Ltd.,
Managing Committee Member, IEI BLC.

Er. S. A. Nadgauda,
Superintending Engineer, CIDCO Ltd.,
Managing Committee Member, IEI BLC.

Er. V. C. Kamble,
Ex. Addl. Chief Engineer, CIDCO Ltd.,
Managing Committee Member, IEI BLC.

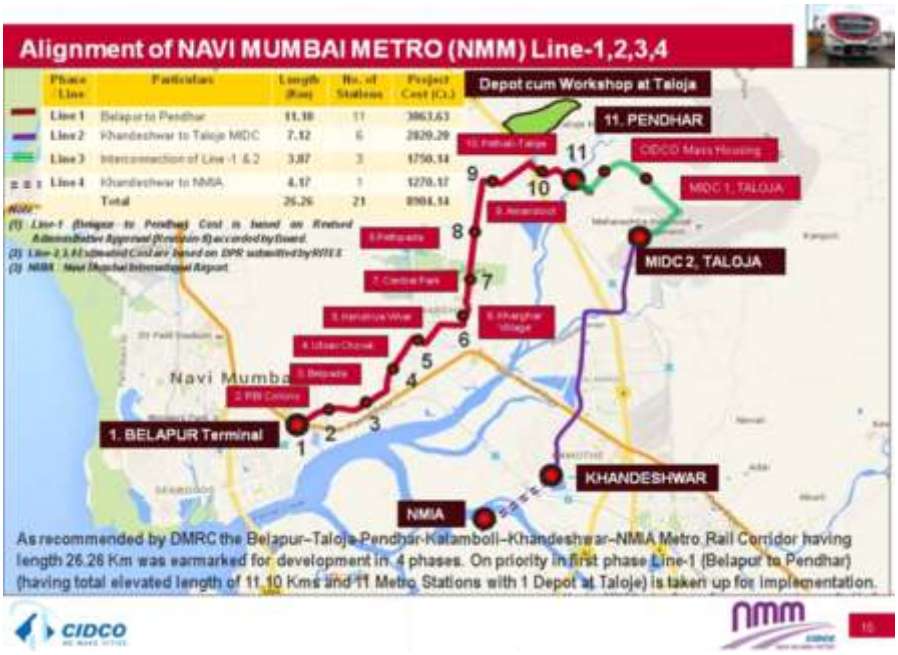
Er. D. R. Hartalkar,
Superintending Engineer, CIDCO Ltd.,

Background:

Govt. of Maharashtra is implementing the Navi Mumbai Metro Rail Project through City and Industrial Development Corporation of Maharashtra Ltd. (CIDCO), a Govt. of Maharashtra Undertaking, incorporated under the Companies Act, 1956. Considering the expected future demand for Public Transport, CIDCO has envisaged developing Metro Rail Corridors in Navi Mumbai, in addition to Suburban Rail System & Bus Based Public Transport System.

Based on the Detailed Project Report (DPR) for Navi Mumbai Metro Rail Project prepared by Delhi Metro Rail Corporation (DMRC), the Corridor-I as Belapur-Kharghar-Pendhar-Taloje-MIDC-Kalamboli-Khandeshwar to be extended to Navi Mumbai International Airport (NMIA), is considered to be developed in Phases.

In the first phase, CIDCO has taken up the development of Navi Mumbai Metro Rail Corridor-I, Line No.1 (Belapur to Pendhar) having Elevated Length of 11.10 Kms., 11 Stations and Depot at Taloja. The funding for Rail Corridor-I, Line No.1 (Belapur to Pendhar) having Project Cost of Rs. 3063.63 Crores is being done by CIDCO through surplus internal accruals without any financial assistance.



Notification of Alignment:

The Ministry of Urban Development, Govt. of India vide notification dated 09th January 2015 has notified the Alignment for Navi Mumbai Metro Rail Project, Corridor-I, Line No.1 from Belapur to Pendhar under Section- 32 of the Metro Railways (Construction of works) Act 1978 for implementation of project under Central Metro Acts.

CIDCO is planning to take up Line 2, 3 in near future and Line 4 will be taken up with the integrated planning of Navi Mumbai International Airport. The details are as under:

- Line 2 : Khandeshwar to MIDC Taloja : 7.12 Kms.
- Line 3 : Interconnecting Line No. 1 & 2 : 3.87 Kms
- Line 4 : Khandeshwar to NMIA : 4.18 Kms

The DPR prepared by DMRC is reviewed by RITES and the same has been approved.

Why Metro Rail ?

As the traffic demand in the Metro Cities is increasing multifolds due to increase in population and rapid urbanisation, there is a trend to use private mode of transport, such as two/ four wheelers; which causes many hazards such as traffic congestion, wastage of natural fuel, increase in pollution and is prone to accidents. Thus, it is necessary to focus on public transport that can curb all these problems.

As a primary mode of public transport, Suburban Railway is serving as one of the most efficient Mass Rapid Transport System connecting Mumbai with its Suburbs & Navi Mumbai. However, it has its limitation to cover nooks & corner of the City. Bus based Public Transport can cover intricate areas, but consumes natural fuel & enhances pollution.

Metro Rail as Mass Rapid Transport overcomes all these issues as it runs on electricity, causing no pollution in the City. In fact, it is economical in terms of energy consumption, as it consumes about 1/5th energy per passenger Km compared to road based transportation system. As in the case of Navi Mumbai Metro, the line is elevated, it does not consume ground space. Moreover, the system is so sophisticated that it is very safe and practically accident free. The journey is comfortable and generally a maximum walkable distance for a passenger would be about ½ Km, considering the average spacing of stations as 1 Km.

Salient Features of Navi Mumbai Metro Line - 1 :

Total Route Length	:	11.1 Km – Elevated Viaduct (Box Type Segmental) (Belapur to Pedhar)
Nos. of Stations	:	11 Nos – Elevated
Gauge	:	1435 mm (Standard Gauge)
Traction Power	:	25 KV AC (Over Head Catenary)
Track Work	:	Ballast-less Track on Viaduct & Depot
Rolling Stock (Trains)	:	Rail Vehicle with- 3.2m width, 22m length 8 Trains of 3 Cars (24 Cars) of Initial Procurement. Capacity per Train is @ 1125 passengers.
Peak Head Way (Frequency)	:	8 minutes (Initial) in peak hours 12 minutes (Initial) in non-peak hours
Signalling System	:	Advanced Technology of Communication Based Train Control (CBTC)
Fare Collection	:	Automatic Fare Collection System
Maintenance Depot	:	At Grade at Taloja - Panchanand (20 Ha.)

Various Components of Navi Mumbai Metro:

(1) Viaduct: Viaduct is the bridge/ runway for the entire stretch with intermittent stations, carrying two tracks for to & fro traffic. The viaduct also carries all cables for various systems. It also carries a parapet, housing a walkway for the passengers in case of emergency evacuation. The viaduct rests on piers that are mostly accommodated in the median of the road, so that carriageway is free for road traffic. The depot approach viaduct connects Metro Depot with the Main Viaduct.

Along the alignment of Navi Mumbai Metro, there is a Railway Crossing near Taloja. As there are 6 tracks to be crossed below the span in skew alignment, the requirement of span was about 100 m. Due to limitations posed by structural considerations & operational Diva-Pavel line, the span was designed in Structural Steel. The weight of this huge girder is 1400 MT and is rolled all along its length, within limited block hours sanctioned by Central Railway Authority. The structure has about 20 Km welding and 22,000 HSFG bolts. For the first time in India, such a huge span is constructed & launched for Metro, over the Operational Railway Tracks.

(2) Station Work:

A typical Elevated Metro Station is a Two Level Structure, resting on series of piers emanating from underground foundations. The first level is above the mandatory clearances of road beneath, which is concourse level. It houses Ticketing/ Non-Ticketing Areas & Some Associated Offices/ Sub-Station. The second level continues to rest on the same piers, which is platform level, enabling the passengers to board the Trains. The roof structure is made out of Structural Steel with Galvalume/ Polycarbonate Sheet covering.

The Terminal Station i.e. Belapur C.B.D Station has the facility of double discharge which enables the passengers to board/ de-board on either side of the Train. It also has an additional platform to enable the reversal facility.

All the Stations are provided with Staircases, Elevators (Lifts) and Escalators as access from Ground Level to Concourse and from Concourse to Platform Level.

(3) Depot Work: The Metro Depot is located at Taloja on area of about 20 Ha. It has a Workshop, Inspection Bay, Wheel Lathe Unit, Heavy Washing Plant, Automatic Washing Plant, Stabling Yard etc. to carry out routine and periodical maintenance. The Depot also houses Operation Control Centre (OCC), Depot Control Centre, Playback & Training Room (PTR), Auxiliary Sub-Station, Stores and Effluent Treatment Plant etc. Most of the Operation Controls are located in Depot.

(4) Systems Work: Metro Systems contract comprises of Design, Manufacture, Supply, Installation, Testing, Commissioning of Complete Rail Systems on Turnkey basis, consisting of Rolling Stock, Signalling & Train Control, Power Supply, Traction, SCADA, Communication, Track Work, AFC, Depot Equipment's, Integration of various Rail Systems Components, including Rail System Maintenance for 3 years.

All the Trains (8 trains each of 3 coaches) along with many Depot Equipment's, such as Diesel Shunting Loco, Rail-cum-Road Vehicle, Catenary Maintenance Vehicle, Mobile Lifting Jacks, Automatic Washing Plant, Wheel Lathe, Bogie Testing Equipment's etc. are procured and housed in Depot.

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Courtesy : CIDCO LTD.

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Managing Committee Meetings

Skill Development and Innovation

Amar Jadhav
CEO & Founder,
Apprend Innovations Pvt.Ltd

Background :

There is no need to underline importance of skill education for engineers. The situation is really worsening day by day. There is always struggle in the minds of students whether to acquire basic academic knowledge or to acquire skill sets on priority. Efforts are being made at different levels to bridge gap between academia & industry. However still there is need of great efforts on all fronts. Skilling is required on all fronts to make engineers employable, deployable and to be entrepreneurs. Various skill sets viz. soft skills, technical skills and relevant business skills need to be taught parallel to academic programme. There is also need of giving opportunity to practise these skills during academic programme so as to keep them updated. This requires concerted efforts on the part of all stakeholders viz. industry, trainers, academic institutions and recruiters.

Right now everybody is acting in isolation. All of them need to be brought on a single unified platform to make them understand need of the hour and act in cohesive manner.

keeping this in mind we have created online platform bringing them together and giving access to one another i. e. apprend. in

Apprend is a course aggregator and skilling + placement platform for engineers and engineering students. They bring 20+ years experience in the field of engineering education and hence understand the need of hour. The platform is designed as an online portal to bring all stakeholders on board to make our youth deployable in early stages itself. Apprend provides skilling, training, internship and placement opportunities to students from the engineering sector.

Scope for collaboration with IEI:

IEI is premier organisation working towards skilling of engineers as one of its most important objective with legacy of more than 100 years and huge pool of resources especially human resources from different sectors of engineering industry and academic institutions. We wish to run a pilot project at Solapur smart city with the help of IEI

Solapur Smart City Incubation Center Initiative:

Objectives:

We propose to run incubation center at Solapur to address the need of Solapur city and adjoining areas. Solapur city has been declared as a smart city by Govt. of India along with other 100 cities approx. They have identified projects to be undertaken in Solapur city in phases as per the priority and availability of funds. A lot of ground work needs to be done to implement those projects. It also creates opportunities for start ups revolving around needs already identified by smart city project which can also be extended to smart villages under the scheme of Govt of Maharashtra.

Organisations involved:

1. Academic Partners (In discussion) - 5 major engineering institutions in Solapur district have agreed to collaborate with us through their students and resources.
2. Apprend - Unified online platform which will provide access to online portal to execute the vision, connect all the stakeholders to the platform, and incubation center.
3. SoBus NGO - Contribute to the knowledge Pool (SMEs, Mentors, Partners), Support with Ideas, Talents, Technology for the operations & help to build holistic , outcome -driven innovation ecosystem
4. Solapur Smart City Corporation Support with Ideas, Talent and Technology for the operations, help to build a holistic, outcome-driven Innovation ecosystem and provide internship opportunities for students

PROPOSAL:

Connecting IEI to engineering students and industries through online portal of apprend, creating nodal centers across Maharashtra and later India which will carry out the activities for all offline requirements, augmenting skill related programmes to candidates through IEI resources and mentoring incubation centres are few areas where we can work together towards its cause .

Following are the areas wherein we seek IEI's involvement in the above initiative

1. May provide resources from their community and physical infrastructure,
2. Recognise some of the skill programmes.
3. Mentor startups.

★ ★ ★

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Engineering Solutions for the Conservation of Heritage Structures

Chetan R. Raikar

Introduction:

Built heritage is a part of cultural heritage of any society and it provides a continuity and meaning to the society. Heritage conservation is necessary as it helps protect andmaintain the built heritage in their current state, and prevents further damage anddeterioration. Conservation requires understanding of architectural details, structuralaspects as well as material science.

Conservation & restoration of built heritage hence requires a multi-disciplinary effort. A team, usually a multi disciplinary team, based on the type and extent of the problem, should work together in conserving heritage structures.

Philosophy:

Heritage Conservation requires understanding of the history of the structure, its cultural significance as well as the structural and material characteristics. Understanding the styles of architecture in a heritage structure is critical in case of adaptive reuse. In short,

heritage structures provide an excellent opportunity for studying aspects of structural engineering, materials science, forensic engineering, building design and history along with architectural features.

Conservation requires thorough knowledge of the following:

- The original building materials of the structure
- Type of construction and construction techniques
- Types of materials and their ingredients
- Historical research covering the entire life of the structure including
- Both, changes to its form & physical dimensions/features
- Usage and any previous structural repairs/restoration efforts
- The present state of the structure, damages or distresses
- Its structural behavior

In order to gather and assimilate all these information, several activities like researching the historic records, survey and inspection of the structure, laboratory testing of materials, non-destructive testing, understanding the structural framework and seismic behaviour of the structure etc. are required.

The varied type of activities, as illustrated, will require the services of professionals like historians, archaeologists, structural engineers, material scientists, architects, construction experts, mechanical and electrical engineers. The present scenario of heritage conservation is such that architects dominate the field. Structural Engineers and material scientists are either not involved or, if involved, they seldom get the freedom to put into effect their suggestions, leave aside other professionals like historians and archaeologists.

The role of a structural engineer in the structural evaluation process and condition assessment of historic structures is indispensable. They have a major role to play in it:

- Studying and understanding the structural behaviour of different components of the structure
- Assessing the strengthening requirements with particular reference to seismic behaviour
- Assessing the structural safety

The damages to the structure can be of two categories, namely structural damage or material damage. The damages need evaluation so as to identify which category the damage belongs to e.g. the cracks in the structure may be due to material deficiency or structural deterioration. In such cases, cracks will have to be carefully examined to understand their cause. Thus, structural appraisal of a building is vital in evaluation of historic buildings.

Structural appraisal may include inspection, structural analysis and testing of materials or even load testing of structural components. In historic structures, damaging movements may be the result of inadequate design and construction, inadequate or inappropriate maintenance, decay and unplanned alterations.

During the inspection, it is important to note the deficiencies in original design, deterioration of structural elements and damage done to the structure during its life to understand the cause of structural deficiencies. There can be structural movements like subsidence, settlement, sway, bulging of walls, cracks etc. Deformations and cracks due to movements which may threaten the use or safety of the structure will have to be carefully distinguished. Careful examination can reveal whether the movement is ongoing and detect in which direction it is propagating.

The construction materials of ancient period like lime mortar and the type of construction like vaulted roofs, arches, huge walls and wooden frames may have an inbuilt ability to withstand some structural movements (flexibility) which will have to be understood clearly while deciding the retrofitting measures. Water ingress can also be the culprit behind the decay of most structural materials like masonry damages, timber decay, sulphate-attack of cement and concrete or rusting of steel or iron which will have to be identified and taken care of.

It is equally important to study the type of materials involved in construction and their ingredients and the extent of erosion or decay. There are several organic materials like horse hair, belgiri fruit, jaggery etc. used in ancient construction materials like lime mortars. The study of the building materials to understand their ingredients and composition is essential to arrive at proper repair techniques. The contribution of material scientists in this field is significant.

In short, assessment of the gravity of any particular structural distress or symptoms and the causes mainly needs an understanding based on practical experience of the performance of historic structures, and the contribution of the non-structural fabric in the performance of the structures, rather than mere calculations.

Distresses in heritage structures can be due to the following reasons:-

a. Neglect

b. Lack of awareness of preventive maintenance

c. Improper/inadequate maintenance

d. Rent control act

Heritage structures are generally referred to consultants in advanced stage of damage. Generally, neither drawings nor construction details of the structures are available. The owner does not bother to retain the record of any maintenance carried out by him in the past or any repairs/alterations carried out to the structure during its serviceable life. Usually, the data like the type of material used, construction details and cross sectional drawings of the concealed junctions are not available which poses a great problem in any investigation.

The first job that a consultant is required to undertake is to prepare the drawings and construction details of the existing structure on “As is where is” basis. The collection of samples of various construction materials and sending the same for tests like Compression test, Petrographic examination etc. becomes the next step in line.

After preparation of architectural and structural drawings, the consultant is required to ascertain the load transfer path and find out the areas of localized over stressing. Distress mapping drawings are then prepared based on visual observations, and non-destructive tests are carried out on various structural members.

The following non-destructive tests can be deployed at the site.

a. Schmidt Rebound Hammer Test

b. Ultrasonic Pulse velocity

c. Cover meter

d. Coring

e. Moisture meter

f. Petrographic examination

g. Endoscope etc.

Though endoscope has been mentioned here in non-destructive testing techniques, it is essentially an inspection tool for spot inspection of distresses/deterioration observation. Endoscope finds the following use in heritage structures.

1) Inspection of eroded wooden /steel joist ends buried in the masonry walls.

2) Inspection of mild steel / cast iron water supply and rain water pipes from inside for corrosion.

3) Inspection of voids and cracks observed in concrete and masonry structural members for grouting.

4) Inspection of cavity wall It is extremely important to maintain the overall balance of old stuctures during restoration. Load transfer path may alter during restoration due to inadequate/insufficient propping and over stressing occurs at the distressed locations. The following inspection techniques are routinely deployed during restoration of the heritage structures.

   a) Strain gauge monitoring: Strain/stress levels in suspect areas while carrying out major alterations in the structures can be measured accurately. This data can be further used to design structural strengthening schemes.

   b) Load testing: Individual components of structures can be tested before and after strengthening to check efficacy of repair technique deployed.

c) Crack width monitoring using dial gauges and crack width gauges: It is extremely essential to monitor the existing cracks appearing in the masonry during repairs using these techniques. Some cracks are “live” and some cracks are “dead”. Live cracks are the cracks which are actively widening/narrowing, and dead cracks can turn live due to changes in stress level during repairs. Hence, it becomes necessary to monitor these cracks to avoid any minor damage to the structure during repairs.

d) Moisture meter: It is particularly important after carrying out water proofing or moisture proofing of a particular area to check efficacy of the same.

The subject of Instrumentation and Inspection techniques is a vast subject and is very useful in carrying out “Just the Right” type of repair/strengthening to the heritage structures. Sometimes due to inadequate/insufficient data, the restorer tends to over strengthen a particular portion of the structure which causes change of balance in the load transfer path causing localized over stressing in other areas of the structure. On the other hand, sometimes the restorer does not strengthen the structures to the extent required which does not offer a long time relief.

A Case study In order to explicate the structural aspects underlying conservation, the restoration of Pune University Main Building structure is enumerated here. The structure was 139 year old and had undergone several distresses like partial collapse in the east elevation and south west corner portions, profuse leakage from the clay tiled roof of the structure and cracks in the stone masonry etc. Originally built as a Governor’s monsoon residence, the structure had undergone change of ownership and usage over the years and was subjected to some interventions and additions due to change of usage.

Gold Leafing :

The earlier investigations to the building had confirmed usage of gold leafing work in the interiors of the rooms which substantially increased the conservation cost. Samples were taken of the alleged gold leafing work and tested in UDCT, Mumbai. The results revealed no traces of gold and confirmed the usage of gold paint. This experimentation brought down the cost of construction substantially. This is an explicit example to impulsive conclusions which was avoided due to detailed investigations.

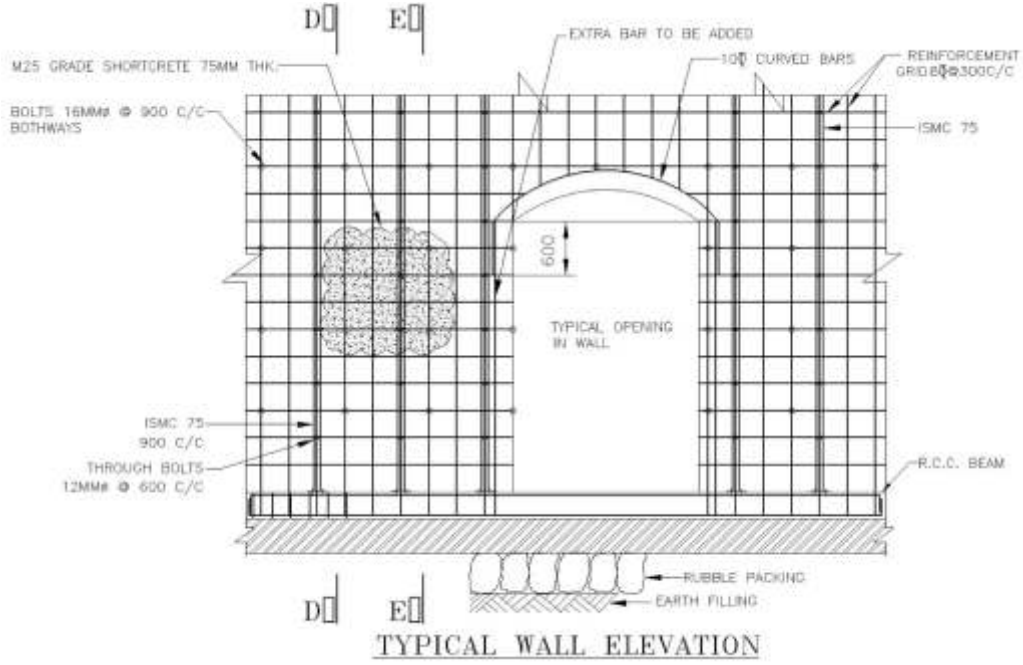
Earthquake resistance :

One of the major lacunas in an earthquake resistance structure was identified as asymmetry in its plan and elevation. Two dimensional analysis of individual walls were carried out using suitable soft wares. Nominal load carrying capacity of the walls was assumed for the structural analysis since it was observed that the in-fill material used in the load bearing walls included construction debris, broken brick bat etc. Slenderness of the wall was checked in both the directions.

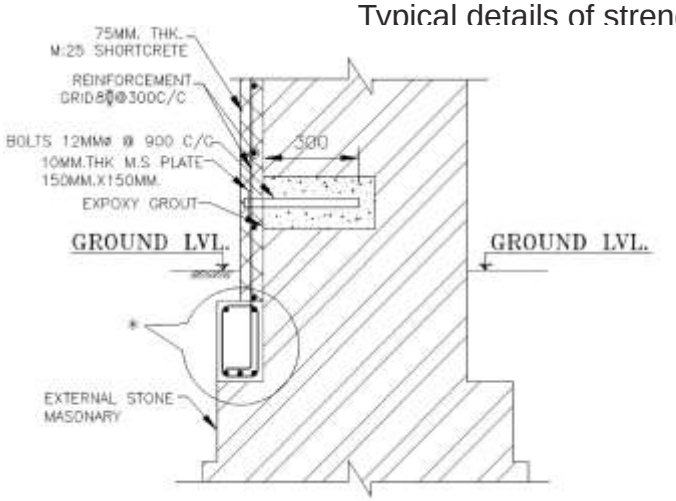
Load Bearing Walls:

The reason of collapse of load bearing walls was identified as over stressing of the walls due to ageing and original poor quality construction. Since the material used for the construction of walls was greatly varying throughout the structure. It was recommended to enhance the load carrying capacity of the walls substantially. Other options like grouting the walls & replacing the walls were considered, but were outraced in comparison to strengthening which was the ultimate option as grouting would not have been effective and replacing the walls would require propping and was against the principle of minimum loss of authenticity.

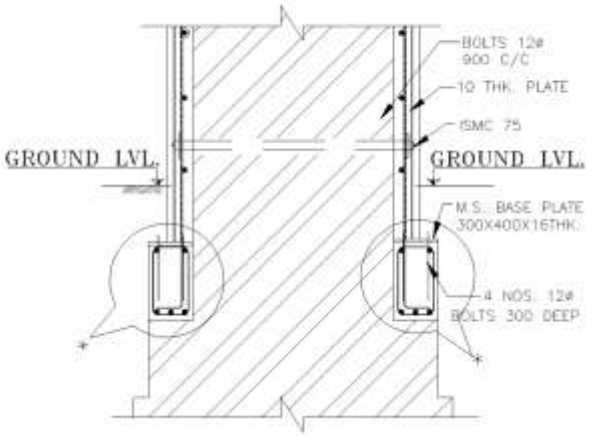
Strengthening was carried out by providing structural load bearing walls on both the sides of the existing wall using either shortcrete or jacketing technique. Through bolts were provided to effectively hold these two walls together which was necessary for effectiveness. Since all the internal walls were rendered with lime mortar, the same finish was re-done over the shortcrete. This increased the thickness of the internal wall by 150 mm and external wall by 75 mm. The flooring which was disturbed in certain areas was re-laid. Suitable foundation was constructed for effective load transfer and shortcrete was taken right up to the roof level and was effectively tied up at the end of the wall. This ensured improved bearing to wooden trusses and joists throughout the structure.



Typical details of strengthening of walls



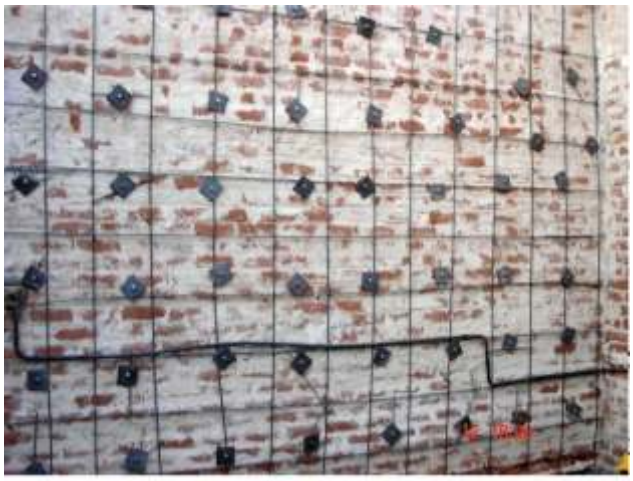
Section E-E



Section D-D

Endoscopy of wood was another method which saved enormous quantity of wood during conservation. It was used extensively to identify erosion in wooden members at the roof level and at the plinth level in dance floor. The eroded wood and those infested by white Typical details of strengthening of walls ants could be identified and replaced and the rest could be salvaged; thus, saving tremendous cost during conservation

Wall strengthening by shortcreting



The roof of the building has clay Mangalore tiles over wooden trusses and battens in some areas and flat terraces having cement/lime concrete water proofing in the rest. The flat terrace water proofing wherever leaking was tested using an ebonite hammer for debonding. The debonded water proofing was re-done using brick bat lime mortar over laid with lime concrete. Clay tiles of the entire sloping roof were removed and replaced after cleaning. The broken tiles were replaced with new tiles. Marine plywood was additionally provided as planking below wooden purlins and battens.

Wooden planking was expensive and hence it was decided to provide plywood, as the false ceiling provided below would camouflage the plywood planking, and aesthetics won't be affected. The plywood planking was provided with polymerized bitumen based membrane over the entire surface to make them waterproof in case of

Wooden trusses of roof after repairs

seepage of water due to cracking/breaking of tiles.

Eroded wooden members like rafters, purlins etc. were repaired. Localized areas and minor cracking in structural wooden members were made good by filling the cracks and voids with a mixture of specially formulated epoxy and saw-dust. Partial replacement of wooden members was done where major portion of the section could be salvaged. This technique was implemented typically in wooden beams and joists which were eroded towards the ends buried in the walls. Complete replacement of wooden sections was resorted to only where the wooden members were infected by termite and/or eroded beyond serviceability. Steel plate flitching was done at the junctions of beams and columns to improve the earthquake resistance of the structure.

Conclusion :

The safety and stability aspect of the building is of utmost importance in any conservation effort along with maintaining the aesthetics and historic value of the building. Inadequate knowledge or experience of conservation architects in the structural aspects of building conservation is a limiting factor to the conservation initiatives. Hence, the contribution of more and more experienced structural engineers and material scientists in this field is vital to make the conservation efforts more effective.

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He is a professional structural engineer with a Bachelor degree in B.E. Civil from Sardar Patel University, Gujarat and Master degree of Science in Conservation of Heritage structure from Herriot – Watt University, Edinburgh, UK.

Council Meetings

Engineering for Unique Infrastructure Projects

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Synopsis: *The author shares his experience of long years of working in lead role of project execution and consultancy for mega projects in J&K in particular and Pan India, in general. While the opportunities and challenges before the engineering community are brought out, at the same time the solutions generated for critical stages of signature projects are illustrated by case studies for motivation of engineering fraternity.*

1. Introduction:

Government of India has launched National Infrastructure Pipeline on 31st Dec 2019. These constitute Housing, Safe Drinking Water, Clean and Safe Energy, Healthcare, Educational Institutions, Modern Railway Stations, Airports, Bus Terminals, Metro and Railway Transportation, Logistics & Warehousing, and Irrigation, at total cost of Rs 103 lakh crores. The country has to get ready to plan & execute this massive mandate for development of our country.

The proposed investment need structural changes for Engineering and Project Management profession. It is well known fact that the infrastructure projects experience cost and time overruns. The major reasons are delays due to multiple approvals, complicated land acquisition process and long drawn dispute resolution process. The situation is aggravated due to loosely worded contract documents, change of specifications during course of execution of works and poorly trained human resources. In the government sector, the vast time of engineering officers is spent in contractual dilemmas for resolution of variations, non-schedule items and interpretation of vague contract agreement's phrases.

The role of human resources is dominating in the contract management. To start with, the curriculum of engineering courses need a relook. It needs to incorporate the latest technology, incorporation of Business laws and in internship for at least six months.

The engineering professional need to update their professional skills regularly. A well-balanced mix of academic knowledge and rich experience is idle for development of professional skills. This needs in-service trainings for practicing engineers and exposure of academicians for challenges of field execution. What is needed by the industry is a "thinking engineer" who can avoid the generation of disputable items and also resolve the same if at all it arises during course of work execution.

The role of senior organizational management too has large bearing on capability building for such major projects. The organizational challenges in remote areas have to be tackled, as many employees have to stay away from their families for long periods. The medical and educational facilities are scarce. The availability of senior industry experts too, for site visits, becomes a challenge.

The arrangement of machinery and spares in remote areas is a long lead item. Further, the vagaries of weather too plays a role as an important impediment. The success lies in remaining with the team and motivating them even on small achievement.

With the above backdrop, few case studies are taken up where in spite of above gaps, some unique projects are in progress. All of these projects were held up in course of execution but with the aim to proceed further, the engineers have resolved the issues and projects are moving ahead on steady course.

2. Case Study I:- Construction of Railway Bridge over river Chenab in J&K

This bridge is being constructed as part of Udhampur-Srinagar Baramula new Broad Gauge Railway line being constructed at height of 359 m above bed level of river, once completed, it will be the highest railway bridge in world. The challenges have been manifold- difficult geology, high wind speed of 222kmph (gust of 3 sec), low temperature, steep slopes of gorge and difficult to approach. The main span of this bridge is steel arch of 467m single span.

One of its novel feature has been the cable car to be used for launching of arch members and to be used for maintenance during service life. The span of cable is 915 m, the longest in world. It was a challenge to take the cables across the valley. For this purpose steel balls were used to take a low diameter cable first and gradually higher diameter cables were pulled in incremental manner.

Picture 1. The cable way for Chenab bridge

Picture 2: The steel ball for crossing the cables

3. Case study II:- Construction of Bridge over Anjikhad rivulet

Like Chenab bridge discussed earlier, at this location too the Geology of the adjoining hills is very poor. The initial design of an steel arch bridge of 265 m span had to be abandoned. New thought process was started to dovetail the solution to accommodate the weak geology. It was proposed to construct a Cable stayed bridge with single pylon and 290 m cable stay span over the gorge of 195 m deep. This type of bridge has been adopted for the first time for Indian Railways for 25 t axle load and 100 kmph train speed.

Picture 3: Anjikhad Site with Difficult Geology

4. Case study III: Planning for elevated viaduct for four Railway tracks and to remove all ground tracks between Kamakhya to New Guwahati.

Railway need to have four tracks instead of existing two tracks between Kamakhya to New Guwahati for increased train traffic. This length of rout has 12 level crossings within 10 km which not only decrease line capacity of train route but also cause great hardship to citizens due to long waiting time when the gates are closed. Further the tracks are dividing the town into two parts.

Detailed topographic survey in heavily built up area was not only time consuming but its accuracy would have been dependent on skill and sincerity of survey team. Instead of total station Aerial Drone was used to obtain overlapping ortho images and using special software, virtual 3-D continuous images of complete section were obtained. This greatly reduced the time for planning of concepts for elevated viaducts for four tracks.

Picture 4: Drone Survey Snap Shot

In addition to above, a systematic planning for phase wise working of the execution plan has been developed so that project can be executed without hindering the present train operations. For the first time the drawings have been prepared for elevated mainline railway station.

5. Case Study IV:- Construction of a Road bridge at Dhamkund over River Chenab.

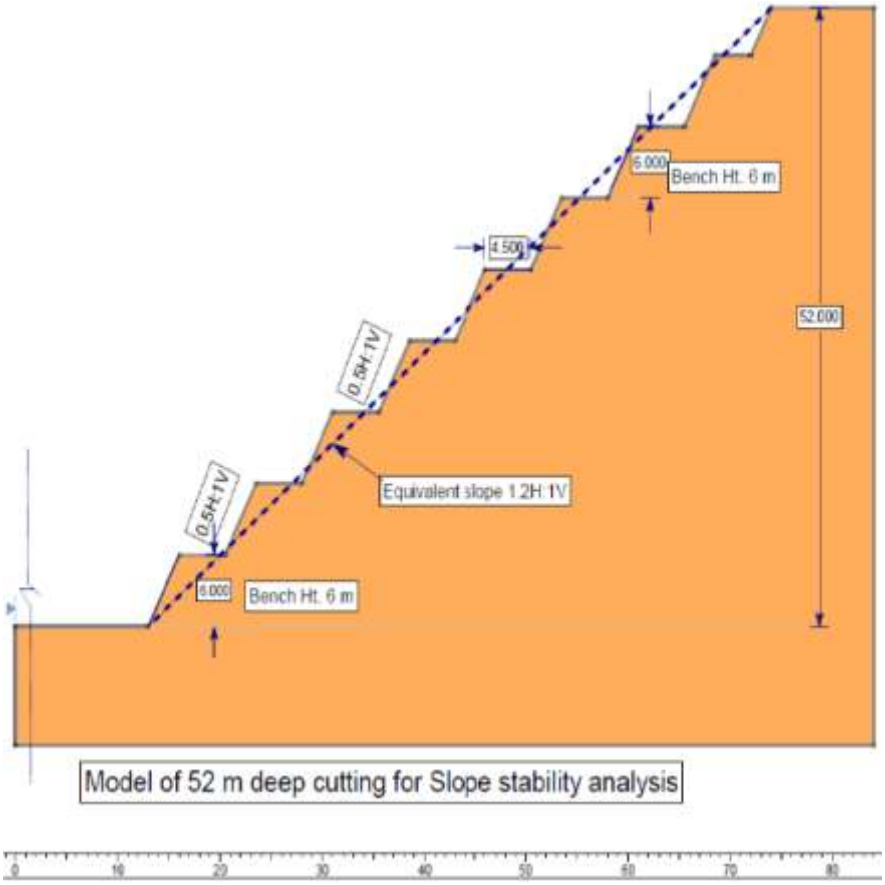
For the execution of Railway project in J&K, as in above case study I & II, road approach for project sites to move heavy construction equipment were necessary. For this purpose an old suspension bridge of capacity 10 ton had to be replaced by 40ton design. As space for assembly of 100m span was inadequate, the entire girder was assembled piece by piece, over the river by, through cables. The bridge with 100m + 35 m span could be completed and paved the way for construction of project as well as provided facility for local villages as long distance route buses were started to connect with Jammu and Srinagar.

Picture 5: Launching of Steel Truss of Bridge Through cables

Picture 6: Completed Bridge Opened for Heavy Axle Load Traffic

6. Case study V: Planning for construction of a siding in more than 50 m deep cutting.

In State of Odisha, a Railway siding needs to be constructed in cutting more than 50 m deep. The technical studies were done and with design of engineering slopes, the project could be conceived. This will lead to over all economic development of the region.



Picture 7: Analysis of Deep Slope for Railway Siding

7. Conclusions: The most difficult projects are executed with the perseverance of simple "thinking engineers" and leaders with broad mindset. To be successful in professional life, the engineers have to continuously update their technical knowledge and leaders have to support them in their endeavors. One has to be innovative to overcome technical challenges. Codes and Manuals lead us to standard designs. To conceive a unique design for a challenging site, it needs venturing into extreme engineering. The ideal combination of knowledge, experience, innovation and leader's support generate courage for creating unique structures for the benefit of humankind.

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Solar Photovoltaic Systems

Dr. Mini Rajeev, FIE

Backgraund :

Energy sector in India is dominated by centralized power stations which are located far away from the users. Power stations, substations and transmission lines occupies land space and are expensive to build and maintain. Transmission and distribution losses in India is reported to be around 22% [1]. Other issues with the conventional generation are bad environmental impact and sustainability of the conventional sources. Thermal stations are having problems of low efficiency leading to burning of more coal thereby increasing the CO2 and other gaseous emission levels. Besides this, high maintenance cost, huge water usage and mercury content in ash are other drawbacks. Nuclear waste disposal is a problem as far as nuclear power stations are considered because the byproducts of nuclear reaction are highly radioactive. As fossil fuels are depleting, sustainability of the conventional sources is another issue. These limitations of the centralized generation expedited the growth of “Distributed Generation”.

Distributed generation (DG) is a system that has smaller, decentralized sources that generate electricity near to the user similar to the cell phone towers. DG by renewable energy sources is getting increased attention, primarily due to the demand for clean energy. Additional benefits of DG by renewable sources include reduced environmental pollution, improved service reliability, reduction of line losses, grid voltage support and conservation of the resources. Therefore, the utility companies consider DG as a solution to meet increased consumption of electricity, rising fossil fuel prices and environmental pollution.

Among the renewable energy sources, solar Photovoltaic (PV) technology is gaining more visibility as it has many advantages as compared to other renewable sources. These advantages are drop in the price of solar PV panels, less pollution, improvement in the conversion efficiency, long operational life of around twenty-five years and less maintenance. Occasional cleaning of the PV panels is the only maintenance needed. Besides this, PV systems have a huge potential in a tropical country like India where sun shine is there around 5hrs a day. However, a power system cannot depend only on renewable energy and this is because of the intermittent nature of renewable energy sources. Hence storage may be necessary.

According to MERCOM India research, 30GW solar installations are there in India as of March 2019. Karnataka tops with the highest large scale solar installation among the states in India, followed by Telangana. Maharashtra is eighth in the order as far as large scale solar installations are considered and second in case of solar roof top installation.

Solar PV systems can be classified in to Standalone PV systems, Grid connected PV systems or Utility interactive PV systems and Hybrid PV systems. Standalone PV systems are not connected to the utility grid and needs storage in most of the applications. Grid connected PV systems are connected to the utility grid and used widely. Hybrid PV systems could be standalone or grid connected type systems having one or more sources other than PV.

Standalone PV systems

Standalone PV systems (SAPVS) operates independently and are cost-effective when it is used to supply power in remote locations where there are no other sources of electrical energy. Fig.1 shows the block diagram of a SAPVS with storage. Typical examples of SAPVS are street light, water pumping, parking lots, navigational aids, communication etc. Another example is that the refrigerators powered by PV panels, carried by camels allow vaccines to be kept in good condition and transported to remote villages. For solar powered pumping application storage is not necessary because pump can be operated when sunshine is there.

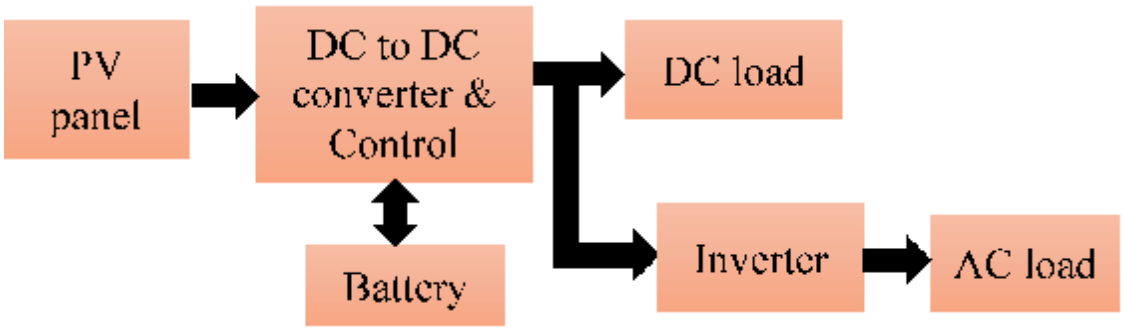

Fig.1. Block diagram of a standalone PV system with storage.

As shown in Fig.1, SAPVS consists of a PV panel, power electronic converter and its control, battery and DC loads. For AC loads another power electronic converter named inverter that converts dc to ac is needed. Battery is needed to store electricity for night time or cloudy days during the day. Commonly low maintenance lead-acid battery is used. Control is carried out for (i) tracking maximum power from PV panels and (ii) preventing over charging and over discharging of batteries.

Maximum power needs to be tracked due to the non-linear characteristics of the PV panel. The characteristics changes if there is a change in sun irradiance or temperature. Many algorithms are used to operate the PV panel at the maximum power point under all conditions. Battery charging and discharging needs to be controlled in order to improve the life of battery.

Grid connected PV systems

Power generated by PV panels is connected to the utility grid. The generated power can be optimally used through grid connected PV systems (GCPVS) as the grid can sink any amount of power and storage is not necessary. Furthermore, a power system cannot operate depending only on renewable energy owing to the fact that there is always a mismatch between the renewable energy generation and the consumer demand. Therefore, grid connection is the only solution to fully exploit the generation from the renewable energy sources. The applications of GCPVS can be classified as low power applications (residential) in power levels up to tens of kW and large power applications (solar power plants) for power levels in MW range. Various national and international standards needs to be adhered to while feeding generated power from PV to the grid.

Another advantage of GCPVS is net metering. Net metering is an advantage because the user can sell any unused energy to the utility. If PV system is generating more power than the usage, the

excess power will flow back into the grid, turning energy meter backwards. Conventional energy meter cannot be used in that case. Because of the advantages, GCPVS have become highly popular and will definitely contribute a major share in Distributed Generation and will be a major source of power generation in future.

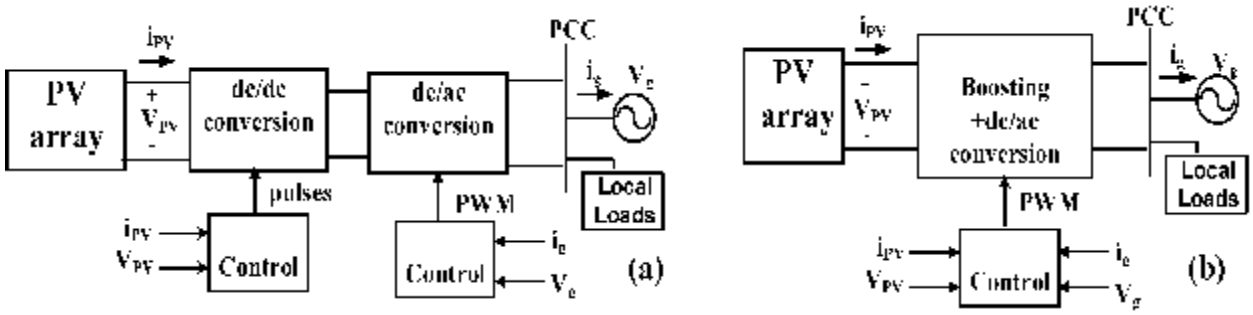

Fig.2. Block diagram of two stage and single stage GCPVS [2].

GCPVS are classified in to single stage power conversion and two stage power conversion systems as shown in Fig.2 [2]. The efficiency and reliability will be lesser in two stage systems as the number of power conversion stages and components are more. Control in not complex due to separate control of the two power conversion stages. However, in single stage systems efficiency and reliability will be better but control complexity is higher. In both systems, objectives of control include (i) maximum power point tracking of PV panels; (ii) grid synchronization and (iii) control of power fed in to the grid.

Among GCPVS, roof top solar installations are getting increased attention, where PV panels are installed on the roof of residential or commercial or institutional or industrial buildings. The advantages of such installations are (i) it is simple and cheap and (ii) it reduces the requirement of land for expansion of solar projects. Considering residential applications, an average house can accommodate 1-3 kWpeak of GCPVS. As a thumb rule, about 10sq.m shadow free area is required to set up 1 kWp grid connected rooftop solar system. Solar roof top calculator provided by Ministry of New and Renewable Energy (MNRE), nodal ministry of Government of India, is given in [3].

References

[1] https://www.electricalindia.in/transmission-losses-in-india/

[2] Ph.D. thesis, Mini Rajeev

[3] https://solarrooftop.gov.in/rooftop_calculator

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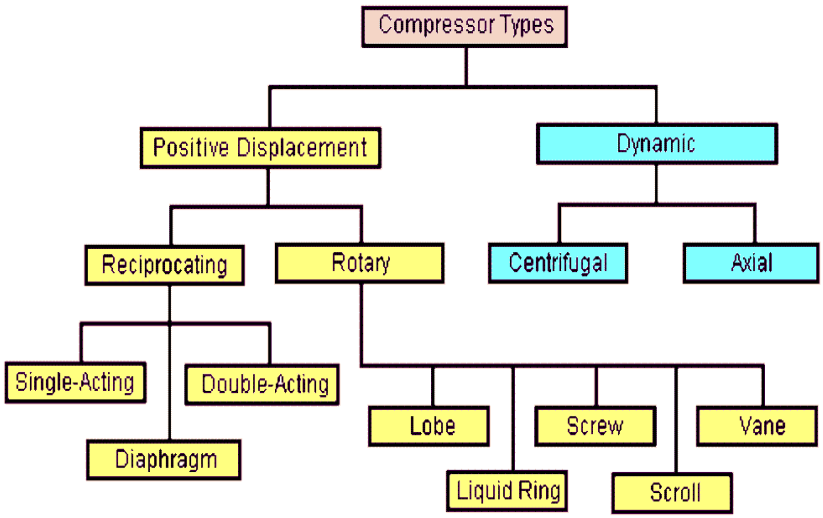
Coducting AMIE Examination

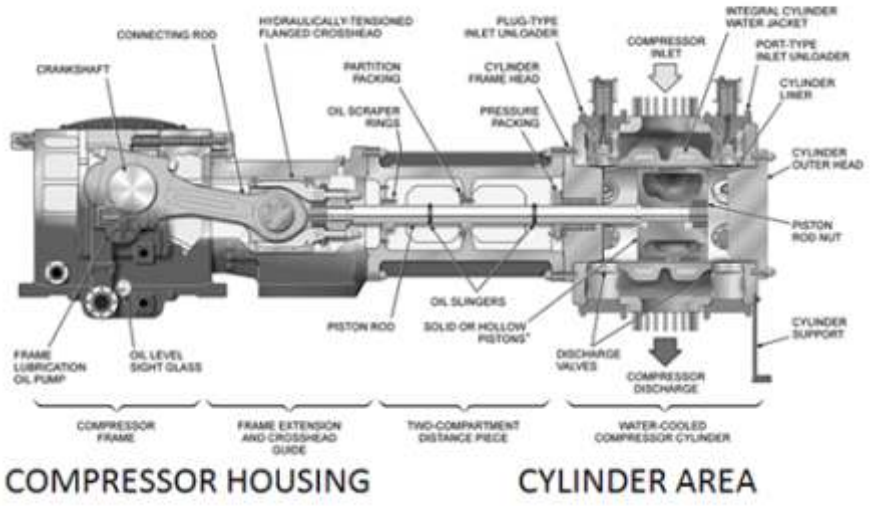
Importance Of Teflon (PTFE) in Non - Lubricated Type Reciprocating Compressors

R. K. MODI, FIE
Past Chairman, IEI, BLC

A compressor is a mechanical device that increases the pressure of a gas by reducing its volume. Types of compressors given below



Reciprocating Process Compressor Components



This article will limit to positive displacement Reciprocating Process Gas compressors.

Reciprocating compressors are positive-displacement machines that compress and move gases by using a combination of rotational and linear (reciprocating) motion. Their basic function is to raise the pressure level of the gas being compressed.

Reciprocating compressors incorporate a cylinder and piston, piston rings, inlet valve, discharge valve and a drive assembly consisting of a crankshaft, connecting rod and drive, such as an electric motor/ gas engines as shown below in the diagram of a double acting reciprocating compressor

The compression process begins with piston movement in the cylinder creating a greater volume that decreases the pressure. This allows the inlet valve to open, resulting in gas flow in the cylinder. Once the piston reaches the end of its stroke, the inlet valve closes and the piston moves in the opposite direction, reducing the volume in the cylinder and causing gas pressure to increase. When the pressure is high enough to overcome the gas pressure in the discharge line, the discharge valve opens, allowing the gas to escape in the discharge line. The cycle is repeated as the piston moves back and forth. For each cycle, gas is drawn into the cylinder, compressed and delivered to the discharge piping. The piston rings maintain a seal between the piston and the cylinder, which lets the gas be compressed without leaking past the piston.

The Compressor is classified as Lubricated or Non-Lubricated compressor. There are Two areas that require lubrication in a Lubricated reciprocating compressor –

1. Compressor Housing: Crank Shaft, Connecting Rod, Cross Head

2. Cylinder Area : Piston/Piston rings, Valves, Piston Rod, Packing/ Pressure Packing

In lubricated compressor both areas i.e. Compressor Housing and Cylinder Area are lubricated where as in non-lubricated, only compressor housing area is lubricated. Cylinder area remains dry.

There is big demand for non-lubricated type compressors capable of replacing the conventional lubricated due to

1. With the development of Industries such as Petroleum, refining, petrochemical and chemical, the kind of gases being treated in compressors in such process plants require higher purity and quality.

2. It is not desirable to mix lubricating oils or impurities into gases such as those where catalysts are used such as poisoning of a catalyst in a reactor or strict purity and qualities of products are needed

3. Lubricating oil causing chemical reaction with gas must be prevented.

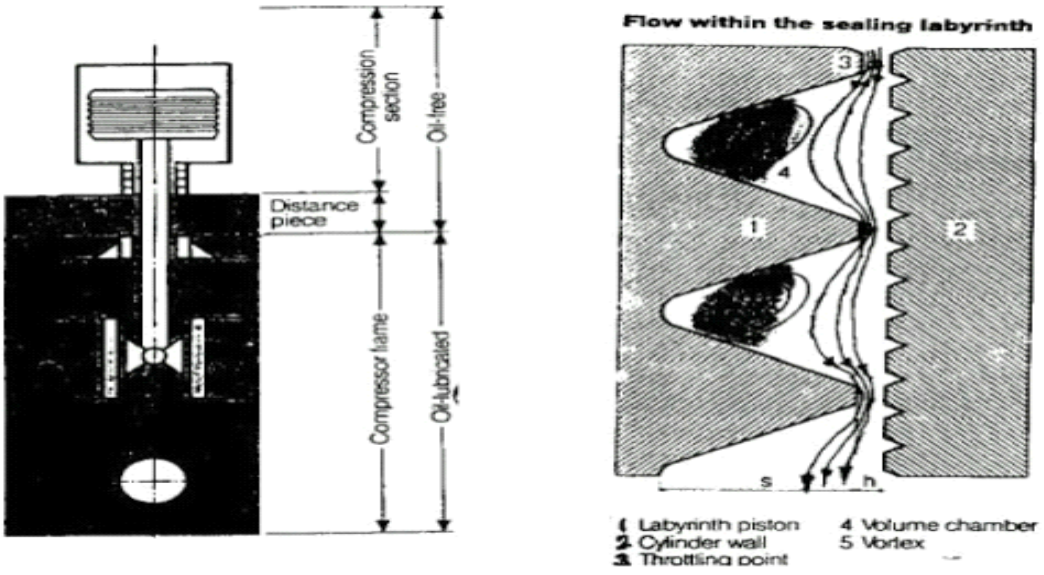
4. Where the lubricating oil cannot be utilised due to severe operating conditions.

5. Air purity is critical for many applications where even the tiniest drop of oil, or air contaminated with oil can cause product spoilage, product recall or damage production equipment, Oil Free Air compressors are required to meet ISO 8573-1 Class Zero.

Types of Non lubricated compressors are (1) Labyrinth piston type (2) Carbon Ring type (3) Teflon ring type.

1. Labyrinth Piston type compressors

In Labyrinth type compressors, gas compression is achieved by reciprocating piston fitted with labyrinth rings to prevent gas leakage by so called labyrinth effect. A compressor capable of boosting their discharge pressure up to 200 kg/cm2,have been in the market but due to high pressure, gas tightness maintained by labyrinth effect may reduce the efficiency of compressor. It is suitable only for Vertical reciprocating compressor



VERTICAL COMPRESSOR WITH LABYRINTH PISTON

2. Carbon Ring type

Piston rings are of carbon having self – lubricating property. Due to absorbing property of carbon, vapour in gas is absorbed on carbon surface and absorbed foreign molecules activate lubrication. Carbon rings wear very fast in compression of highly dried gas and it is brittle. Hence it is not suitable for high pressure service and dry gas compression. Its use is limited to medium pressure and medium capacity

3. Teflon Ring Type compressors

Teflon, a brand name of **PTFE- Polytetrafluoroethylene resin** marketed by Du Pont in 1950 has been in use in the field of seals for several years. PTFE finds application in most varied areas of industry. It is known commercially under various trade names such as TEFLON (Du Pont), FLUON (ICI), ALGOGLON (MANTEFLUOS), IFLON (GFL) etc.

A table below shows the range of application, cylinder arrangement & features of all three type of non-lubricating compressor. It is very clear that labyrinth and carbon ring type compressors have limitation over capacity and pressure i.e. medium pressure and capacity. These compressors cannot handle large capacity and high pressure up to 10000 psi. So these two types of compressors were replaced by Teflon Ring type compressor.

Table below shows that Teflon Ring caters the need of all type of cylinder arrangement,

Large capacity and high pressure.

TYPE	RANGE OF APPLICATION	TYPE OF CYLINDER ARRANGEMENT	FEATURES
Labyrinth Piston	Medium Capacity Medium pressure	Vertical only	Ideal non lubricated compressor Low efficiency
Carbon Ring	Medium Capacity, Medium pressure	Vertical, Horizontal Balanced/ Opposed,"V" & "W" type	Quick wear in Dry Gas, Brittleness of Carbon ring
Teflon Ring	Large Capacity, High pressure	Vertical, Horizontal Balanced/ Opposed "V" & "W" type	Applicable for all type of Gas, Ring material Chemically stable, High efficiency

Teflon has been in use in the field of seals for several years. Teflon finds applications in the most varied areas of industry. The base product is powder which is then compressed and heated in suitable dies until a homogenous structure is obtained& from this finished parts can be obtained by machining.

The sliding seals, to fulfil their function properly, must have three fundamental requisites:

1. Low wear coefficient so as to limit heating & reduce wear on the parts in contact.
2. Good thermal conductivity to facilitate removal of the heat generated
3. High mechanical strength to support the pressure difference to which they are subjected.

For the purpose of obtaining these three requirements with PTFE, the principal properties of basic resin remaining the same, the various manufacturer have brought into use of various type of filler to the polymer during sinterisation. Various manufacturers of PTFE have tried and experimented with

many types of filler, but those which find the widest application in the field of compressor are the following

1. Carbon- Graphite
2. Glass fibre
3. Glass, fibre and possible addition of Molybdenum disulphide
4. Metallic powder
5. Ceramic powder

The choice of one or other type of fillers is normally made on the basis of experience in various fields of application. For the non-lubricated reciprocating compressor filled PTFE Piston Rings, Ryder rings (It supports the weight of Heavy Pistons) and Piston rod packings/ Pressure packings are adopted due to the following characteristics

1. Exceptionally low friction coefficient in combination with metals and PTFE.
2. Anti-adhesive behaviour without any stick-slip effect.
3. High elongation properties enabling easy fitting of piston rings and guide rings to one piece piston
4. Exceptionally large temperature range from -200 to + 260 degree celsius.
5. Chemically resistant to almost all solids, liquids and gaseous media.
6. Physiologically neutral in the stated temperature range.
7. For a range of applications, the filled PTFE family provides a superior self-lubricated material with excellent strength, high hardness, and improved wear resistance.
8. By careful formulation and selection of filler materials, the sliding wear behaviour or self-lubricating properties of filled PTFE materials have been improved to give longer lifetimes, especially in dry gases.

Thus Teflon (PTFE) has found an important place in Non-Lubricating Reciprocating Industrial Compressors.

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Photos Seminar_Conventions

Towards a Bio Artificial Pancreas (BAP)

Prof. Jayesh Bellare and Group,
IIT Bombay.

The treatment of diabetes, particularly insulin dependent diabetes, is a multi-factorial problem complicated by the fact that a patient's pancreas (and islet cells, which actually generate the insulin) do not generate enough insulin. However, insulin produced by some other animal species does work quite well in humans: pig insulin was the mainstay of diabetes treatment until the recent introduction of genetically modified biotechnology product. It would have been good if the pancreas or cells of such animas (or of other donor humans) could have been transplanted into patients. But this has not been successful, mainly due to rejection.

The bio-artificial pancreas (BAP) we developed is based on a hollow fiber membrane, which is a narrow thread with a central hole. When a liquid is present inside (or passed through) the inside hole (called lumen), then the wall selectively prevents certain constituents from passing through and allows others to pass through. This process of selective separation is widely used for industrial and biological separation processes including that in kidney dialysis. Here in this work, we have given an additional function to the hollow fiber membrane, namely the ability to grow and sustain cells which can provide important biologic functions: insulin generation, in this case. Ordinary membrane materials do not support cell growth. The important contribution in this work has been to modify the material used for the membrane so that it can promote the cell growth, together with the immunoisolatory feature. This combination of properties namely, the ability to separate and grow cells is unique. Our hollow fiber membrane is made up of the base polymer (polysulfone) and additive TPGS (d-α-Tocopheryl polyethylene glycol 1000 succinate).

When we try to make an artificial organ such as a bio-artificial pancreas, the device has to support the growth of insulin-secreting type of cells. These can come from human or animal sources, and for human cells they can be from the same person (patient) or another person (donor). For each source of cells, the cells can be insulin-generating islets type of cell or they can be a stem cell that can be made to differentiate into insulin producing type of cells. If they come from an animal or another human, the possibility of an immune reaction is there, which is reduced if the cells are from a stem cell origin. If a suitable selective barrier is placed between the cells and the patient, the immune reaction can be largely or totally suppressed. The advantage of our hollow fiber membrane is that it supports the cell to grow by mimicking the extra-cellular matrix in which the cells naturally grow, and, simultaneously, allows in a selective manner to let the insulin to reach the patient while preventing an immune reaction from cells if they are of foreign origin.

To make a device, one or more hollow fibers are placed together to form a small bioreactor. In the future, larger configurations can also be made.

Our hollow fiber membrane has been tested with both stem cells as well as porcine islet cells in order to prove their versatility. Future experiments and extensive trials in small and large animal as well as in human can only decide which of these cell type will be proved most useful.

This is an example of early-stage proof of concept. That is works has been proven in mice in whom diabetes was induced chemically. It showed restoration of normalcy of blood sugar for a period of 30 days. Therefore, this research has the potential for being taken up for further trials leading to human trials. We are in the process of transferring the technology to a company that will develop this further.

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Reference : Teotia, R.S., Kadam, S., Singh, A.K., Verma, S.K., Bahulekar, A., Kanetkar, S., Bellare, J., Islet encapsulated implantable composite hollow fiber membrane based device: A bioartificial pancreas (2017) Materials Science and Engineering C, 77, pp. 857-866. DOI: 10.1016/j.msec.2017.04.003

Lectures


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Supply Chain Management in Hydrocarbon Sector

Mr. Upendra Maheshwari
Executive Director
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Engineers India Limited.

Energy is required for development and presently Hydrocarbons are one of the major sources of energy. Hydrocarbons find their usage from fuels used in transportation to feedstock for petrochemical and fertilizer plants. These hydrocarbon projects are mega projects involving considerable capital expenditure in the tune of billions of dollars and their execution requiring considerable experience and expertise.

These Projects become more critical in nature considering the mega investment as well as the safety aspects associated with handling of hydrocarbons. Therefore quality, safety, cost and schedule take a very important role in their execution.

The major types of equipments in these plants are Pressure Vessels, Rotating and Static Machinery, Electrical and Instrumentation systems besides bulk piping, electrical and instrumentation material. These items are used in critical conditions and environment and therefore also have exotic and expensive metallurgy. These items being critical for plant operation and their fore need to comply the quality requirements as any correction at site or during pre-commissioning or commissioning would delay the schedule and add to costs. Therefore, during their manufacture the equipments are inspected to ensure that all quality norms and specifications are fully complied.

For the successful delivery of equipments, besides design and engineering an effective supply chain management is the key. The key aspects in optimum supply chain management include (a) vendor identification and its evaluation (b) Evaluation of Techno Commercial Proposal (c) Monitoring and expediting during manufacturing and (d) Testing and Inspection with final delivery to site. These aspects are covered in trailing writeup.

Any supply chain process involves interacting with a number of suppliers and external agencies. The supply chain process therefore involves steps considering accountability and transparency with adequate consideration of compliance with time cycle and efficiency. The first step in supply chain commences with the short listing of the right supplier for the equipment. This involves the evaluation of potential suppliers both from financial and technical parameters. The key critical technical and financial parameters are evaluated for the specific equipment. The vendor's past experience in supply of similar equipment with quality parameters is also considered. Also, while short listing the potential suppliers it is also ensured within constraints that adequate competition is also generated.

The short listed vendors are invited for providing a Techno Commercial Proposal which is evaluated as per norms and in line with the agreed purchase procedure with client. After due evaluation an order is placed on the vendors. Thereafter, it is required that the vendors are adequately monitored to ensure that the equipment is delivered as per specification within schedule.

These mega projects have procurement of multiple equipments with varying complexity and therefore the items are categorized and classified based on the extant of inspection required. For critical items progressive inspection during various stages of fabrication is required with final inspection before delivery. Important items have final inspection and bulk non critical items have only review of suppliers internal reports.

Inspection services are not just confined to review of documents of vendors but also utilize the knowhow of engineering, vendor capabilities and past experience to ensure that the various stages are executed by vendor such that all the parameters of specification, quality and schedule are adhered.

To conclude, an efficient supply chain managemnet in mega hydrocarbon projects involves critical coordination and monitoring commencing from vendor identification, evaluation, order placement, expediting and inspection as per quality plan. Considering the safety aspects of hydrocarbon plants as well as the investments involved all these aspects require considerable attention and expertise on the part of members of Supply Chain Management team.

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Author

Mr. Upendra Maheshwari is presently Executive Director (Supply Chain Management – Inspection) with Engineers India Limited. He is B Tech Chemical Engineering from IIT, Kanpur and M Tech from IIT, Delhi. He is working with Engineers India Limited since last 35 years and has been associated with a number of Divisions like Heat and Mass Transfer, Energy and Environment, Advance Control & Optimization, Marketing and Inspection. He has authored and presented a number of papers in various Indian and International Conferences.

Introduction To Material Testing Laboratory

The Institution of Engineers (India) was granted The Royal Charter of Incorporation, 1935 by His Majesty The King George V of England in 1935 to promote and advance the Science, practice and business of Engineering in all its branches in India.

The Belapur Local Centre was set up in May 1994 on plot of 1020 Sqm in CBD Belapur, Navi Mumbai.

The Institution of Engineers (India), Belapur Local Centre have started The Material Testing Laboratory in Year 2011.

The Material Testing Laboratory is an independent leading testing laboratory in Navi Mumbai and Mumbai area. The laboratory has high standard for quality and intensity. We have highly educated and experienced team, which satisfies all the customers for timely submission of reports and carrying out tests based on latest standard methods. We ensures the customers impartiality and keep the records confidential.

Our Laboratory is ISO 2001: 2015 and approved for testing in CIDCO Ltd., Panvel Municipal Corporation and MSRDC etc.

Further our laboratory has been accredited by NABL and issued the certificate of ta in accordance with the Standard ISO/IEC 17025:2017 for General Requirements for Competence of Testing & Calibration Laboratories in the field of Testing.

The Quality Policy and Objective of our Laboratory is as under.

- Material Testing Laboratory is committed to achieve customer satisfactory by providing trust worthy test reports complying the requirement of latest standards.
- Good professional practices.
- Ensuring tests based on latest standards.
- To ensure test reports based on latest calibration certificates and accuracy in testing.
- To adapt high quality and to implement policies and procedures.
- Ensuring continual improvement for implementation of latest standard test.
- Also conforms to the requirement of International Standard ISO / IEC 17025: 2017.

Technical Site Visits

Exergy Analysis as a tool for Energy Efficiency Improvement

Dr. Samir Nimkar

Introduction

Energy is life. Energy is an important for the progress of all the countries of the world, and especially, the countries that are developing from an economic point of view. It has been observed that the energy sector has played a crucial role in the context of the global economy. Prices of oil and such other sources of energy have been affecting the economies of various developing nations and have been playing crucial roles in shaping them. Energy is the basic input required to sustain economic growth and to provide basic amenities of life to the entire population of a country.

Energy Analysis

We are using energy for domestic and industrial applications. Energy loss during its use is significant. Thermal energy in coal is used to convert into electricity. During this conversion almost 60% of input energy is lost in various ways. Modern gasoline engines have a maximum thermal efficiency of about 20% to 35% when used to power a car. In other words, even when the engine is operating at its point of maximum thermal efficiency, of the total heat energy released by the gasoline consumed, about 65-80% of total power is emitted as heat without being turned into useful work, i.e. turning the crankshaft. Industrial boilers are having efficiency more than 80% for conversion of heat to steam. From these examples it is clear that heat to heat conversion is more efficient that heat to work.

Energy intensive industries are always trying to improve energy efficiency of their facility. Energy balance method based on first law of thermodynamics is preferred method. It is written as

Energy input - Energy output = Energy accumulation

Energy Efficiency = Energy output in product/Energy input = 1 - [Energy loss/Energy input]

The use of energy analysis as a measure of energy improvement may not give true picture. According to the first law of thermodynamics, energy input equals to output. The energy balance of the system will give an account of the energy given to the system, but will not give a picture of the quality of energy within the system or going out of the system. If system input energy is 1kW, product contains 0.4 kW and energy in the waste stream is 0.6 kW, and then the system is balanced. A major part of the energy is lost in the waste stream. Though energy can be destroyed it cannot be fully recovered in the form of work. As quality of energy decreases its application to produce work also decreases. For example heat released in cooling tower in many industry is available at 35oC is of no use hence its heat is discarded into atmosphere. Such type of energy loss in observed in the thermal power plant.

Exergy analysis

Hence it is important to find out real losses of heat which can be recovered for useful output. It can be carried out by Exergy analysis. The exergy of a system is defined as the maximum shaft work

that can be done by the composite of the system and a specified reference environment. The reference environment is assumed to be infinite, in equilibrium, and to enclose all other systems. Typically, the environment is specified by stating its temperature, pressure and chemical composition. With the Second Law of Thermodynamics (SLT), the maximum work that can be produced can be determined. Exergy is a useful quantity that stems from the SLT, and helps in analysing energy and other systems and processes. The exergy efficiency is an efficiency based on the SLT. Exergy balance can be written as

Exergy in = Exergy output in product + Exergy emitted with waste + Exergy destruction

Exergy Efficiency = Exergy output in product/Exergy input = 1 - [Exergy loss/Exergy input]

= 1 - [(Exergy waste emission + Exergy destruction)/Exergy input]

Exergy of a closed system can be expressed as

$$E_{sys} = E_{sys}^{PH} + E^{KN} + E^{PT} + E^{CH}$$

(Where PH = Physical, PT = Potential, CH= chemical)

The exergy of flowing stream is written as

$$E = E_{sys} + (P - P_0)V$$

(Where P = Pressure, V= Volume, P0 = Pressure at reference state)

Physical exergy is the work obtained when the system is brought from its original state to environmental state and Chemical exergy is the work obtained when the system is brought from its environmental state to the dead state.

Rearranging equation and putting H= U + PV we get

$$E = (H - H_0) - T_0(S - S_0) + E^{KN} + E^{PT} + E^{CH}$$

(Where H= Enthalpy, S= Entropy , H0 = Enthalpy at reference state, S0 = Enthalpy at reference state)

The quality of hot stream depends upon the work obtained from it. According to the second law, it is not possible to convert all heat into work though it contains lots of energy. Exergy of thermal energy is denoted by

$$E^Q = \left(1 - \frac{T_0}{T}\right) Q$$

In the real system input exergy is not equal to output exergy. Some part of input exergy is destroyed within the system. An ideal process is perfectly reversible and there is no exergy destruction within the system. In the real processes exergy destruction takes place due to thermodynamic irreversibility. Irreversibility comes with an increase in entropy of the combined system. In the combustion, irreversibility is due to mixing of reactants, fluid friction, chemical reaction and temperature difference. Irreversibility (I) can be written as

$$I = T_0 S_{gen}$$

This equation is known as Gouy-Stodola equation. Calculation of exergy destruction will help to locate targets for improvement. Difference between Energy and Exergy is given below

Difference between Energy and Exergy

Energy	Exergy
Dependent on properties of only a matter or energy flow, and independent of environment properties	Dependent on properties of both a matter or energy flow and the environment
Has values different from zero when in equilibrium with the environment (including being equal to mc^2 in accordance with Einstein's equation)	Equal to zero when in the dead state by virtue of being in complete equilibrium with the environment
Conserved for all processes, based on the FLT	Conserved for reversible processes and not conserved for real processes (where it is partly or completely destroyed due to irreversibility), based on the SLT
Can be neither destroyed nor produced	Can be neither destroyed nor produced in a reversible process, but is always destroyed (consumed) in an irreversible process
Appears in many forms (e.g., kinetic energy, potential energy, work, heat) and is measured in that form	Appears in many forms (e.g., kinetic exergy, potential exergy, work, thermal exergy), and is measured on the basis of work or ability to produce work
A measure of quantity only	A measure of quantity and quality

Applications of Exergy analysis

Two streams containing same energy but maintained at different temperature shows different exergy values. High temperature stream will have higher exergy value. According to exergy analysis energy lost in waste streams like cooling water, stack gas contains low exergy. Hence exergy input is not equal to exergy out. Some part of exergy is lost in the system called as intrinsic exergy loss. Exergy lost in the waste stream is called as extrinsic exergy loss. Exergy analysis of power plant shows that maximum exergy destruction occurs in boiler followed by the turbine, whereas energy balance shows that maximum heat is lost into cooling water and stack gas (fig.1). If causes of irreversibility are known, it will be helpful to find a possible solution for the reduction of exergy losses. Like power plant, exergy analysis can be implemented in various sectors like renewable energy, bioenergy, national energy flow, metallurgical processes, chemical processes, cryogenic process and ecological analysis.

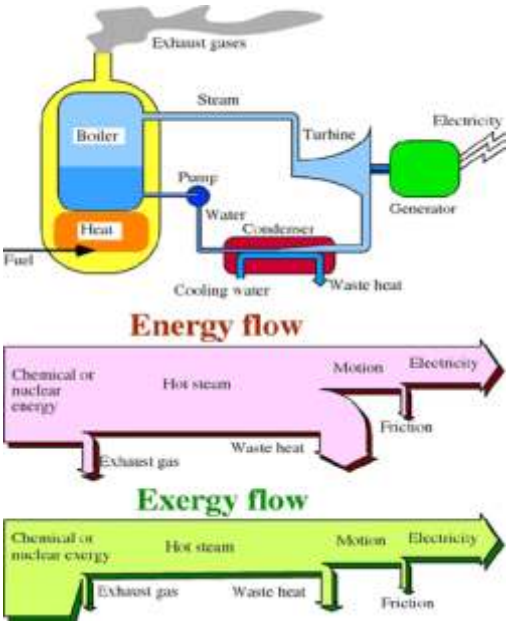

Fig.1 Energy and Exergy flow in power plant (Source: exergy.se)

Further Reading :

1. Exergy: Energy, Environment and Sustainable Development by Ibrahim Dincer and Marc Rosen
2. The Exergy Method of Thermal Plant Analysis by T.J. Kotas
3. Progress in Exergy, Energy, and the Environment by Ibrahim Dincer

*****

(Author is Hon. Secretary of IEI BLC and Lecturer at B.V.I.T. Navi Mumbai)

Students' Chapter Activities

Third Party Inspection and Certification of Railway Steel Girders - A Case Study

Mr. S. P. Singh, FIE
Project Manager, CEIL

Third Party Inspection (TPI) and certification activity is to certify the product, services and activities of the awarded contract, by verifying the compliance to technical requirement of the specifications agreed between supplier and purchaser. TPI is carried out by independent verification agency to check the agreed technical terms and condition without favoring to purchaser and supplier. TPI services ensures the desired quality of the product, services and activities are achieved and certified independently. TPI gives immense value addition to the quality, safety and integrity of the projects. It eliminates the chances of malpractice of accepting the poor-quality product, services, and activities which can occur by raising the deviations in the agreed terms and conditions between supplier and purchasers. TPI services improves the integrity among the client, contractor, PMC, and vendor. Being an independent service, involvement of TPI Agency (TPIA) is limited to inspection activity and TPI participation in tendering, award of contracts, certification of bills and final acceptance activities is avoided.

Importance of TPI Services

Third Party inspection gives the confidence to the purchaser that desired quality of the product, services and activities are achieved. TPI is appointed to avoid the conflict of interest arising out of Project Management consultant (PMC) or contractor inspecting the items ordered for the same project. Most of the times purchaser's engineers are busy in the project administration, technical approvals, supply chain management functions, fund management, bill certification etc and find least time to focus on day to day quality aspects of the project. It is also noticed that customer/ PMC engineers deployed for the inspection activities do not have the desired skill set to study, interpret the variety of technical specifications to be applied during inspection of items. These factors pose a very big risk on quality of deliverables for the project and consequent poor quality leads to huge loss of life, properties and assets. Also, the chances of compromise of the desired quality by the team of PMC/Customer's user group may arise under tremendous pressure of time, cost, technical interpretation and undesirable expectation.

Appointment of TPI Agency

In case, product/services/activities are directly monitored by end user organization, TPIA is to be appointed by a department other than the user department to maintain the objectivities in the inspection. However, if the project end-user/contractor/vendor/sub-vendor/PMC is involved, TPIA shall be preferably appointed by End-user or the ultimate interested party of quality of the product/services/activities.

Indian Railway Steel Girders Fabrication

Technical specification for the steel girders of railway is developed by RDSO based on criticality of operation, loading, environment condition and site feasibility etc.

Indian Railway steel girders are broadly classified in three categories namely 1) Bridge 2) Rail over bridge (ROB) 3) Foot over bridge (FOB) based on their usage / application. Construction wise they are further classified as Plate girders, Truss girders, Semi through plate and open web steel girders (standard), underslung girders, composite girders.

Fabrication of Indian Railway steel girders at different fabricator's workshop and/or at site are

inspected by Third Party Inspection and Certification agency. TPI Services for Inspection of Steel girders involves varied technical and non-technical challenges arising out of including lack of awareness about technical specifications by concerned engineers, challenging site conditions, importance of different grade of steel materials, various welding processes / welding consumables used, specific camber requirements, detailed surface preparation & painting processes, structured documentation for final release of certificate.

Quality Assurance Plan (QAP)

A general guideline and symbolic QAP is developed by RDSO based on the criticality of the project, processes, materials, time and capability of contractor/ fabricator. With this basis, a detailed QAP is prepared by fabricator/contractor and reviewed & approved by Railway/Inspection authority i.e. RDSO, CEIL etc. Prior to start the fabrication, pre inspection meeting is conducted where the QAP specifying the acceptance criteria, extent of inspection by concern agencies, characteristics to be checked and its frequency, reference documents shall be approved for the better control of the quality. Each stage activities, responsibilities, records shall be identified in QAP for better understanding to all the concerned parties and perform the inspection accordingly. Major stage activities like inspection of raw materials, manufacturing processes, Welding, inspection of welding, destructive and nondestructive testing, traceability of the materials, Trial assembly, visual & dimension inspection before clearance to painting, corrosion protection process, HSFG Bolt inspection, final dossiers review and clearance are captured in QAP.

Major Materials

All raw materials must be procured from the approved sources, mostly from RDSO approved vendors. Traceability of the material must be ensured. Purchase from the traders is to be avoided. In case the material is procured from the trader, its traceability to the purchase of plate material and quantity of material transferred to different purchaser is to be checked and original MTC is to be verified.

Generally Steel plates and rolled sections (ISMC, ISMB, ISA) are of IS 2062 Grade E 250 or E 350 with class A/BR/BO/C. These are selected by designer based on the climatic condition, site location, required strength. Mechanical test for UTS, YS, % Elongation, bend test and chemical tests for C, P, Si, Mn, & CE value should qualify the acceptable limit of IS 2062 as a minimum. Plates above 12 mm thickness should be generally normalized and fully killed and must be UT tested.

Stud connectors shall conform to Fe 410C HT as per IS 3935-66. At least HSFG Bolts, Nuts & washer shall conform to (IS: 4000, IS: 6623, IS: 6649), Paint and primer shall conform to (IS: 5666, IS 104, IS 2339), Aluminum wire shall conform IS 2590, Welding consumables shall conform IRS: M39 for MIG, IRS: M46 for FCAW etc. based on welding process.

Manufacturing Process

For the better quality control of dimension, layout shall be drawn as per the approved drawings. Dimensional accuracy depends upon the Jigs, fixture, template & profile of flange, intersection line, pitch, gauge, profile, calibration of measuring tape etc. Proper Marking, cutting, straightening, bending, drilling, and shipping mark delivers better quality.

Welding and Inspection

Mostly joints for track Bridges, ROB, FOB are either Butt Welding or fillet welding. Mostly Submerged Arc welding SAW, Shield Metal Arc Welding (SMAW), and Flux cored Arc Welding (FCAW) welding process is used. Prior to start of welding WPSS are prepared. WPSS are generally prepared as per the IS 9595/ IRS B1- 2001, WBC -2001. WPQR and welder qualification test is performed, it is witnessed and reviewed to establish the requirement in WPSS as per IS:

7310/IS7307 (1) -74. Preheating is to be maintained during fabrication as per the qualified WPQR. Qualified and Approved welders only shall be deployed on the job. Electrode & flux selection and conditioning for free from moisture shall be done properly as per IRS: M28, IRS: M39, IRS: M46 etc. depending upon the requirement. Monitoring of the current is to be carried out as per the approved WPSS. Distortion is to be controlled by following the proper sequence of welding.

Welding visual inspection and NDT (DPT/MPT/RT/UT) to be carried out 100% based on the requirement. RT is to be performed for butt weld. 12 mm thickness and above Plate must be UT tested. Fillet joint is to be tested for DPT/MPT. Macro itching to be done at least once to ensure the penetration of welding is sufficient and run-on and run-off plates to be used for the purpose.

100% weld visual and dimension inspection of steel girder shall be carried out by the TPIA before Trial assembly. Visual inspection of components after trial assembly is to be carried out. On successful completing of trial assembly it can be released for the blasting and painting.

Corrosion Protection

On completing the inspection of the trial assembly corrosion protection is provided by blasting and painting. For this purpose, surface should be cleaned from dust, oil, foreign materials etc., by shot blasting using suitable grit, abrasive materials to achieve the surface profile SA 2.5. Metal spraying by wire method within time duration, at least one layer coating must be applied within 4 hours of blasting and the surface must be completely coated up to specified thickness within 8 hours of blasting. Normally 150 micron quoting is done as per the IRS B1-2001.

Etch primer shall be applied as per IS: 5666 normally 6-10 micron. Zinc Chromate is to be applied as per IS: 104 at least 25 micron. Finishing is done with two coats of aluminum paint as per IS: 2339 with minimum 15 micron each coat. Painting inspection shall be done by calibrated elcometer. Finally shipping mark is to be done as per the drawing.

Final Technical Acceptance

TPIA has to review the entire documentation with respect to contract, approved drawings and approved QAP. Any observation/ non conformity are raised by the inspectors during stage wise inspection must be complied prior to final technical acceptance and issue of the Inspection certificate. Inspecting certificate format shall be agreed between the inspection agency and client. Inspection certificate issue is purely technical clearance and in case there is any commercial implication between purchaser and supplier same needs to be sorted out between them. Inspection certificate shall not be treated as dispatch clearance.

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Visit of Distinguished Personalities

Bulletins Archives

COMPUTER CENTRE

Software has become integral part of engineering. Keeping this in mind Belapur local centre is among the first IEI centre to provide regular software training in it's premises. Currently it is headed by following team members:

Ms. Pervin Solomon, she is Autodesk certified professional in CAD. Field of her expertise is in creating BIM model from 2D drawing and extracting quantities for same and converting it in tender documents. Besides providing training to the students, she has also provided training to number of reputed engineers, architects and builder in India as well as abroad.

Mr. Prakash Bajaj, has graduated in civil engineering from IIT (Bombay) in year 1974 and did his master from University of Michigan (Ann Arbor) in year 1976. He has developed number of software which include PLANWIN, DRAFTWIN and ESTIMATION software which is being used by hundreds of professionals.

Mr. Ahmed Rumane, has over 14 years of experience as a Professional Consulting Engineer and has extensive experience in high profile projects of the Residential &Commercial sector. His leadership has paved the way for several new and creative management changes which led to improved and efficient service on BIM thereby enabling the firm to become leading MEP services provider on BIM platform

MuzafarWangde has graduated in Mechannical engineering in year 2004 from Mumbai university and has got 15 years of rich experience in facade design , Materials, procurement & project management

Currently software training is provided by highly qualified professional with experience ranging from 15 to 30 years. The training for all software's are project based., which helps fresh graduated in securing placement.

Belapur Local Centre has also Guest House facilities to accommodate out of station students coming for training, including well equipped library.

Also we are "Training Partner for Bentley and MIDAS" Products.

We have professional Trainers for MIDAS Bridges and Bentley Software.

The Computer Centre at IEI, Belapur is Conducting Following Training Courses.

1) **BIM** : REVIT ARCHITECTURE, REVIT STRUCTURE & REVIT MEP (MECHANICAL ELECTRICAL AND PLUMBING)

2) **DESIGN SOFTWARE** : ETABS , SAFE AND STAAD-PRO

3) **INFRASTRUCTURE** : MIDAS BRIDGES, OPEN ROAD, WATERGEMS & SEWERGEMS.

4) **FAÇADE** : DESIGN / FABRICATION / INSTALLATION / TESTING

5) **PROJECT MANAGEMENT** : MICROSOFT PROJECT AND PRIMAVERA

6) **MECHANICAL COURSES** : CATIA, ANYSIS, CREO/PRO-E, NX CAD

★ ★ ★

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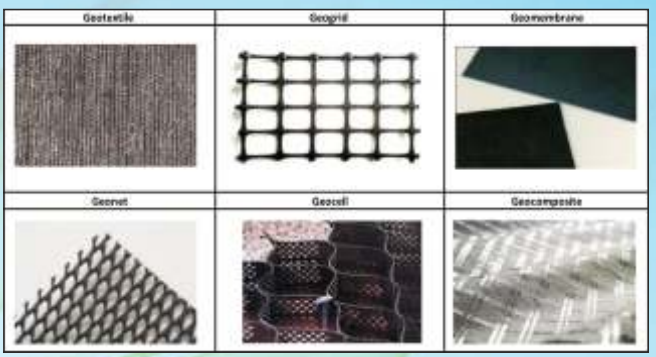
Geo-Synthetics For Development of a Sustainable Infrastructure

Geo-synthetics can be defined as planar polymeric materials used in contact with soil, rock, earth or any other geotechnical engineering related material, as an integral part of a man-made project or a system to perform single or multiple functions. Geosynthetic products when used in building modern day infrastructure, helps to achieve higher efficiency and better performance of the structure's built, reduces usage of conventional aggregate materials, have higher benefit to cost ratios and assists in developing more environment-friendly structures. The six key functions performed by geosynthetics are separation, filtration, reinforcement, drainage, containment and protection. They are permeable and impermeable type. They can be further classified as geotextiles, geotextile-related products and geo-membranes. Most common are geo-textiles, geo-grids, geo-membranes, geo-nets, geo-cells and geo-composites. They are technical textiles and are covered under the segment 'Geotech' by the Ministry of Textiles, Government of India. The above products have applications in the field of civil, geotechnical, transportation, geo-environmental, hydraulic and private development applications including roads, railroads, embankments, retaining walls, canals, erosion control, waste landfills, land reclamation, breakwaters, jetties, groins, revetments, aquiculture, agriculture and mining. Globally these concepts are in practice for over many decades and in our country were first introduced for more than twenty years now. Buoyed by the outstanding results of pilot projects in the areas of road, rail and river development projects, government has increased its thrust on adopting geosynthetics usage in the construction of such infrastructure. Nodal agencies in the last few years have also formulated various Indian standards, codes and guidelines making it more convenient for usage of these products by engineers in the field across application sectors.

The DNA Of Infra-structural Durability & Geo-Synthetics Has Our Polymers in It

Geo-synthetic Products



Applications Sectors

Indian Standards & Codes

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