



STRUCTURAL ENGINEERING

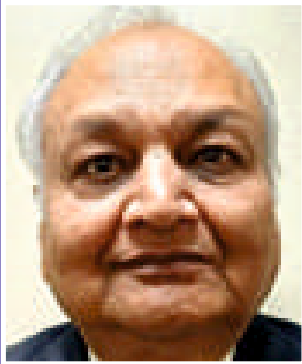
QUARTERLY JOURNAL OF
INDIAN SOCIETY
OF

STRUCTURAL ENGINEERS

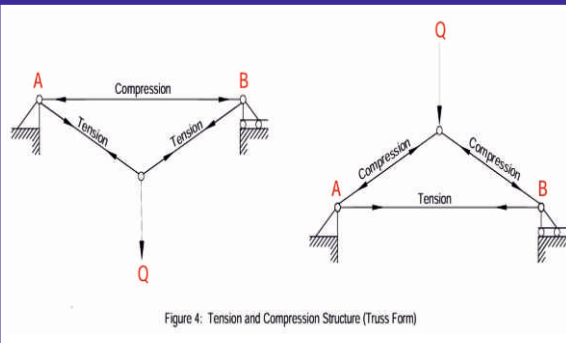
ISSE

VOLUME 27- 3

JULY - AUG - SEPT 2025



GEM 45 PROF. ASHOK K. JAIN - EXCELLENT TEACHER, RESEARCHER, CONSULTANT, AND MENTOR- see page 3



**NET ZERO
BY DESIGN -
MATERIAL
MINIMALISM
FIRST, TECHNOLOGY
AND TRANSITION
NEXT
- see page 15**



NEWS AND EVENTS DURING JULY TO SEPT 2025 see page - 20

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INDIAN SOCIETY OF STRUCTURAL ENGINEERS

ISSE

VOLUME 27 - 3, JULY - AUG - SEPT 2025

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Editor : Vatsal Gokani

Views expressed are authors' or reporters' personal and do not necessarily reflect views of ISSE. ISSE is not responsible for any consequent actions based on contents or information given in the journal.

AIMS & OBJECTIVE OF ISSE

1. To restore the desired status to the Structural Engineer in construction industry and to create awareness about the profession.
2. To define Boundaries of Responsibilities of Structural Engineer, commensurate with remuneration.
3. To get easy registration with Governments, Corporations and similar organizations all over India, for our members.
4. To reformulate Certification policies adopted by various authorities, to remove anomalies.
5. To convince all Govt. & Semi Govt. bodies for directly engaging Structural Engineer for his services.
6. To disseminate information in various fields of Structural Engineering, to all members.

FIELD OF INTEREST

✧ Structural; Designing & Detailing	✧ Construction Technology & Management
✧ Computer Software	✧ Geo-Tech & Foundation Engineering
✧ Materials Technology, Ferrocement	✧ Environmental Engineering
✧ Teaching, Research % Development	✧ Non Destructive Testing
✧ Rehabilitation of Structures	✧ Bridge Engineering & Other related branches

Fraternity News

WELCOME TO NEW MEMBERS

(JULY - AUG - SEPT 2025)

2651	Mohan K. T.	2666	Devi Shailesh Karnani
2652	Dhananjay Pralhad Gawade	2667	Ravindra Shashikant Desai
2653	Satish Nagnathrao Choudekar	2668	Raj Kamal Sharma
2654	Ankush Shankar Avhad	2669	Shubham Shridhar Kale
2655	Balaji Ganpatrao Gajre	2670	Sunil Kumar Garg
2656	Santosh Shivaji Bornak	2671	Santosh Bapurao Kanase
2657	Swapnil Sitaram Herekar	2672	Unmesh Nandkumar Bane (upgrade to LM)
2658	Mohd. Furkhan Ibrahim Pettiwala	2673	Mahendra Sharadchandra Patil
2659	Atul Siddheshwar Patane	2674	Sachin Sukumar Chougule
2660	Prachi Kaustubh Sohoni	2675	Yogita Bayapureddy
2661	Taher Shabbir Merchant	2676	Trupti Rajkumar Nawale
2662	Ramniwas Kumawat	JM 84	Parthkumar Jagdishbhai Lad
2663	Mahesh Zulal Mali	JM 85	Karan Sandip Deore
2664	Akshay Mahadeo Huljute	JM 86	Rutik Pramod Chougule
2665	Sachin Balasaheb Kadam		

Patrons : 38
Members : 2676
Student Members : 727

Organisation Members : 43
Junior Members : 86

Sponsor : 8
IM : 08

TOTAL STRENGTH : 3,586

GEM 45 PROF. ASHOK K. JAIN - EXCELLENT TEACHER, RESEARCHER, CONSULTANT, AND MENTOR

Dr. N. Subramanian



Prof Ashok Kumar Jain (1950-)

Prof. Dr. Ashok K. Jain is a renowned civil engineer with an illustrious career in structural and earthquake engineering. Starting his academic journey at the University of Roorkee as Lecturer in Earthquake Engineering from August 1974 to August 1975, and again from September 1979 onwards as a Lecturer in Earthquake Engineering, Dr. Jain quickly rose to become a Professor of Civil Engineering in 1991. He served as Head of Civil Engineering Department at IIT Roorkee, & Director of Malviya National Institute of Technology, Jaipur. His illustrious career culminated in his retirement from IIT Roorkee in 2016. Prof. Dr. Jain's expertise covers multistorey buildings, cable structures and guyed towers, water tanks, TV towers, steel bridges, and the earthquake-resistant design of reinforced concrete and steel structures. He has been a trusted consultant for various government and private agencies in the field of structural engineering and earthquake-resistant design.

During his illustrious career spanning over 50 years in teaching, research and consultancy, Dr. Jain has made significant contributions to academic literature, authoring four authoritative textbooks in structural and earthquake engineering. His pioneering experimental research on the post-buckling inelastic response of steel bracing members and concentric braced steel frames has been extensively cited, including in AISC 341-2016 and SEAOC Blue Book 2009. Dr. Jain's outstanding research contributions have been recognized with numerous national awards.

Prof. Dr. Ashok K. Jain was profoundly influenced by the Jain philosophy of Paryushan, which emphasizes self-discipline, spiritual purification, and deep introspection; Anekantvada, which emphasizes the multiplicity of viewpoints and the complexity of reality; and syadvada, which underscores the importance of context and conditionality in understanding truths. These tri-ratna philosophical principles shaped his approach to engineering, research, and teaching, encouraging a holistic and inclusive perspective.

EARLY LIFE AND SCHOOLING

Ashok Kumar Jain was born on 17th October, 1950 at Roorkee. He took his early schooling at Jain School and obtained his High School and Intermediate certificates while studying at the Government Inter College, Roorkee. He still remembers attending lecture classes under the sun during winter and under a huge tree during summer. He used to have lunch by sitting on the boundary wall of the school because there were no cafeteria or place to eat lunch in those days. There was a huge play ground where they used to play hockey. He is proud to have done his entire schooling in Hindi medium.

His Father, Sh. Nem Chand Jain, and His mother, Darshan Mala Jain were remarkable persons. Both were highly religious and simple. His father was the leading publisher of engineering books mostly authored by the renowned faculty of the University of Roorkee. IITs came into existence much later. His contribution as a publisher of standard text books in the country is unparalleled.



With his daughter Payal, wife Sarita and father
Sh Nem Chand Jain 1979



With his aunt, young Ashok, mother Darshan Mala Jain,
ant (L to R) 1980



Professor in 1991

With his wife Sarita Jain 2025

ENGINEERING EDUCATION

Dr Jain graduated from Meerut University in 1968 with a Bachelor of Science degree, achieving distinction in all subjects, earning two gold medals from the college, and ranking 24th out of approximately 10,000 students in the University. He was a recipient of National Scholarship, Government of India, 1968-1970. He completed Bachelor of Engineering in Civil Engineering from

the University of Roorkee in 1972, graduating with distinction and honours, and earning 9 gold and silver medals in various subjects, besides Chancellor's bronze medal for standing first in the University. In 1974, he obtained Master of Technology in Structural Engineering from the same university and graduated with distinction. Throughout his studies at the Meerut University and the University of Roorkee, the exceptional library and computing facilities greatly supported his learning experience.

During his doctoral studies at the University of Michigan, Ann Arbor, which he completed in 1978, he conducted extensive research on the post-buckling behaviour of steel bracing members and braced steel frames. This research resulted in the publication of three research reports and three papers in ASCE journal. Dr Jain's experimental investigations significantly enhanced the understanding of post-buckling structural behaviour of steel braces. His contribution in computer coding, modelling, and simulation of non-linear behaviour of concentric and eccentric braced steel frames subjected to earthquake excitation were widely recognized.

Throughout his academic journey, he encountered many sincere and dedicated lab technicians and professors. Their guidance and mentorship deeply impressed upon him the importance of meticulously phrasing problems and methodically solving them. These experiences have profoundly shaped his approach to engineering challenges and research.



B Sc Degree from
Meerut University 196



With PhD Degree
and his wife 1978



Receiving bronze medal from the Chancellor,
Governor of UP in 1972

Teaching at IITR

After completing his research at the University of Michigan, Ann Arbor, he preferred to return and serve his country. Dr Jain rejoined the world renowned University of Roorkee as a Lecturer in Earthquake Engineering in September 1979; became Reader in Civil Engineering in March 1980, and rose to become Professor of Civil Engineering in April 1991.

OVERSEAS ASSIGNMENTS

Prof. Ashok Kumar Jain also had opportunities to work abroad in the following universities:

- Visiting Professor, McGill University, Montreal, May-June, 1995
- Visiting Scientist, McGill University, Montreal, Aug.-Oct. 1991
- Visiting Research Fellow, University of Illinois, Chicago, USA, July -August, 1987
- Visiting Professor, Nepal Engineering College, Kathmandu, Nepal, Nov-Dec, 1996
- Post doctoral research fellow, University of Michigan, Ann Arbor, 1978 to 1979

SIGNIFICANT CONTRIBUTIONS TO PROFESSION

His teaching career stands as a shining example of dedication and passion for shaping the minds of future engineers. With a deep commitment to fostering a strong foundation in Structural Engineering, he has successfully mentored 2nd year, 3rd year, 4th year, and M.Tech students,

empowering them with essential knowledge and skills. His expertise encompasses a wide range of subjects, including structural analysis, RC design courses, numerical analysis, structural dynamics and earthquake engineering, all taught with a focus on clarity and precision. By emphasizing the importance of core concepts and fundamentals, he not only simplified complex topics but also instilled confidence in his students and critical thinking required to excel in their academic and professional endeavours. His impact as an educator is both profound and enduring.

His doctoral research was an in-depth experimental investigation into the post-buckling behaviour of steel bracing members aimed at enhancing the understanding and performance of braced steel frames under extreme loading. He developed a hysteresis model for post-buckling behaviour of steel bracing members. It was coded into DRAIN-2D as EL9 and EL10, a world class software for non-linear dynamic behaviour of 2D RC and steel frames. Published in top-tier journals such as ASCE, globally cited by researchers and practitioners, his work has earned recognition in prominent industry references, including SEAOC – the Blue Book 2009, and the AISC 341-2016 Handbook. He published over 50 papers in reputed international journals, and over 75 papers in national and international conferences besides many research reports.

In 1981, he started the publication of International Journal of Structures, as its general editor, under the guidance of very eminent peer reviewers from various parts of the world – India, Japan, Hong Kong, Singapore, America. This journal had to shut down in 1998 due to lack of quality research papers.

His consultancy practice is centred on the design of innovative structural solutions for a wide variety of projects, including 3D cable structure supported on guyed towers, reinforced concrete and steel buildings, as well as steel bridges spanning from 18 to 120 m. By utilizing the latest cutting-edge software for analysis, modelling, and design—such as

advanced finite element analysis tools and structural optimization software—he delivered highly efficient, cost-effective, and precise solutions. His experience also extends to strengthening MW and TV towers, ranging from 75m to 300 m tall, to withstand extreme wind loading across the country. Additionally, he successfully retrofitted a 64 m steel bridge, facilitating the transportation of 500 MW turbines across the Bhagirathi River for the Tehri Dam project for THDC. These projects demonstrate a seamless integration of modern technology with expert engineering practices to overcome complex structural challenges and deliver lasting, reliable results.

Dr Jain has contributed immensely to the Indian Codes 456, 800, 1343, 3370, 1893, 13920, and many other through various committees of the BIS, New Delhi.

Prof. Dr. Jain was associated with the All India Student Competition for design of steel buildings conducted by INSDAG, Kolkata, for nearly a decade. He came across many talented boys and girls from very remote areas of Tamilnadu, Karnataka and Kerala studying in private colleges. The INSDAG platform was instrumental in exposing them to the latest analytical tools, understanding the nuances of IS 800 provisions, motivating and encouraging them to excel in their professional career.

Administrative Experience as Director, MNIT, Jaipur

Dr. Jain was appointed Director of the Malaviya National Institute of Technology, Jaipur, a deemed university under MHRD, Government of India, New Delhi, in 2003. As the first Director, he was responsible for smooth transition of the REC system into the NIT system, that is, IIT system. As a Regional Engineering College (REC) established in 1963, the students and faculty members were quite disillusioned with the existing administrative structure. The first task was to setup various administrative bodies as per the Memorandum of

Association. Next step was to revise the entire syllabi for all streams, introduce grade system with normal distribution, and tone up the evaluation system to make it more transparent and fairer to students. Several academic, administrative and financial reforms were introduced to make the system more user friendly to the current needs of students, faculty and employees. Became familiar with the legal system in the consumer courts, local courts, high courts and the Supreme court, Human Rights Commission, Minorities commission and the Election commission. He was also associated with the NPTEL program and Accreditation programs of the AICTE

Dr. Jain's Philosophy as a Teacher

There is worldwide demand for Indian students. Reason? A very systematic, rigorous, and comprehensive training over a four-year period. Our education system makes a student rough and tough – ready to face any challenge right from Class 9th onwards. In the University, the emphasis should be on mathematics, numerical modelling, simulation and analytical thinking along with exposure to practical problems. Neither the syllabus nor an end term examination can be a constraint to introduce new ideas and innovations. The students must be exposed to the latest specifications, cutting edge tools, artificial intelligence, and best practices from all over the world.

Contradictions in Teaching

Dr. Jain faced a significant inner struggle as the job market dynamics shifted. While jobs in the IT sector became the most sought after, the attractiveness of core civil engineering jobs waned. Many students pursued degrees in civil engineering merely as a formality while intending to switch to careers in IT and finance. This contradiction between teaching the core principles of civil engineering and the students' aspirations for other fields created a challenging dilemma for Dr. Jain, who strived to balance his teaching dharma with the evolving ground reality.

Contradictions in Research

Similarly, Dr. Jain faced significant inner contradictions regarding the purpose and recognition of research. On one hand, he saw the vital need for research to address the challenges faced by millions of Indians living in impoverished slums and unsafe housing. Yet, this type of research often did not gain recognition in prestigious international journals or citations, which are crucial for academic progress. Instead, researchers were encouraged to focus on areas of interest to advanced Western countries. Additionally, papers published in conferences held at the home institute were often dismissed as home papers and not considered for promotion. This dilemma created a struggle for Dr. Jain, who aimed to balance his professional dharma and commitment to socially impactful research with the expectations and requirements for academic advancement.

Dr. Jain believes that he made the right decision to return to his country, contributed in the development of infrastructure, and saw her ready to become a superpower – socially, spiritually, technically, economically, and politically – in the foreseeable future.

BOOKS



He authored the following text books which are used by several universities and practicing engineers throughout the country and overseas.

- Ashok K. Jain and M.N. Keshva Rao, Fortran Programming, 2nd edition, Nem Chand & Bros., Roorkee, 1990, 312pp.
- Ashok K. Jain, Elementary Structural Analysis, Nem Chand & Bros. Roorkee, 3rd ed., 2023, 767pp.
- Ashok K. Jain, Advanced Structural Analysis with Finite Element Method, 4th Edition, Nem Chand & Bros. Roorkee, 2023, 631pp.

- Ashok K. Jain, Reinforced Concrete: Limit State Design, 8th edition, Pearson India Education Services Pvt. Ltd., Noida, U.P, 2024, 1108 pp.
- Ashok K. Jain, Dynamics of Structures with Earthquake Engineering, 2nd Edition, Pearson India Education Services Pvt. Ltd., Noida, U.P, 2023, 742 pp + 200 pp (3 web chapters)
- Evolution of Earthquake Design Code - A Template for Future, Contributory Chapter 14, in Advances in Indian Earthquake Engineering and Seismology, Springer, 2018.

His book on Reinforced Concrete – Limit State Design earned the honour of being the first book on the subject in India in 1983. Now it is running in its 8th edition, 2024.

CONSULTANCY EXPERIENCE

Design Projects

A list of design of a few important structures:

- 2D Modelling and Analysis of T.G. building for Narora Atomic Power Project (NAPP) for earthquake force including torsion in 1974
- 2D Modelling and Analysis of T.G. foundation for the Narora Atomic Power Project (NAPP) for earthquake force in 1974
- 3D Modelling and Analysis of a communication system supported on a set of four guyed towers (Project Skylark) – consisting of huge cable system hanging nearly half-km up in the sky, subjected to severe wind forces – for Indian Navy in 1981
- Design of blast resistant hangars for the Indian Air Force
- Retrofitting and strengthening of 64 m steel bridge (zero bridge) at Tehri over Bhagirathi River for transporting 500 MW turbines and other machines
(Design requirement: Loading of 305 t (3050 kN) for a 305 MVA transformer; The vehicle carries the transformer on a hydraulic system whereby each axle carries equal load of 233 kN)
- Design of 322 m long and 23.4 m wide Syphon Aqueduct over River Ghaggar, Haryana
- Design of Steel Bridges – 18 m to 70 m for P.W.D. Dehradun, Uttarakhand

- Design of Heavy Foundations for CNC Machines for BHEL, Hardwar
- Design of a 120 m single span steel truss bridge – Gauchar, Karanprayag, Garhwal
- Strengthening and retrofitting of 100 m to 300 m Doordarshan TV Towers for severe wind and earthquake forces in various parts of the country
- 75 kL Kalash water tank over 15 m shaft staging at Bada Gaon, Dist. Bagpat



75 kL Water Tank at Bada Gaon, Dist. Bagpat



Retrofitting and strengthening of Zero bridge 64 m / 48 m at Tehri, 2002



120 m single span bridge for Class B loading – Gauchar, Karnprayag, Garhwal



**(a) Elevation of 322 m x 23.4 m wide Syphon Aqueduct
(b) Cross-sectional view bridge for inspection**

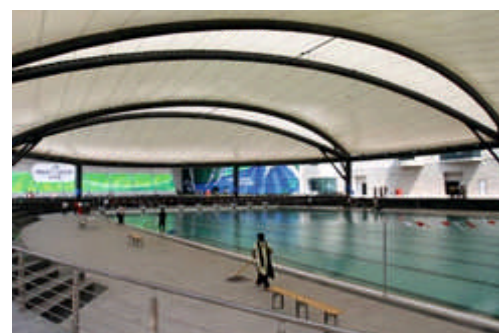
Proof Checking

A list of proof checking of a few important structures:

- Buildings for Commonwealth Games Village 2010
- Training Centre Halls and Swimming Pools for Commonwealth Games 2010
- Yamuna Expressway Intersections – Noida to Agra – JP Associates
- Multistorey buildings in various cities for the DG MAP project, Indian Army
- Precast multistorey buildings for EWS for DDA, New Delhi; designed and built by M/s B. G. Shirke, Pune



CWG 2010 Village



CWG 2010 Training Pools

Investigations into Failure of Structures

A list of investigations into failure of a few important structures:

- Collapse of 75 m pedestrian steel bridge during erection over Ganga canal at Roorkee, 2012
- Collapse of 190 m steel bridge with overhangs during laying of pavement at Srinagar, Garhwal, 2014
- Failure of PSC Box girder over Kosi river, Vijaynagar, Bhagalpur, Bihar, 2012
- Collapse of conveyor belt of a Sulphur plant in a 40 m diameter spherical dome, at an oil refinery, Abu Dhabi, UAE, 2010
- Collapse of 150 m Steel AIR Tower at Delhi, 2014
- Collapse of 650 kL overhead water tank at Noida, 1997



Collapse of 70 m pedestrian steel bridge during erection over Ganga canal at Roorkee



Collapse of 190 m steel bridge with overhangs during laying of pavement at Srinagar, Garhwal



Failure of PSC Box girder as shown in red circle just after transfer of prestress

SIGNIFICANT AWARDS AND RECOGNITIONS

Prof. Jain was honoured with the following awards:

- **Platinum Jubilee Lecture entitled Disaster Prevention and Mitigation Through Engineering Built Environment – Engineering Science – Indian Science Congress Association, 93rd Congress, Hyderabad, Jan. 2006**
- 2nd best paper award of Indian Society of Earthquake Technology for 1980 on the paper entitled, Static and Dynamic Buckling of Steel Members (Vol 17, No.1, March 1980, p.11-18).
- University Grants Commission Career Award for Research 1987-90.
- Certificate of Merit award of the Institution of Engineers for 1987 on the paper entitled, Housing in Regions Prone to Cyclones, Vol 68, Pt CI 3, Nov 1987, p 143- 149.
- Indian Service of Engineers Research Award, University of Roorkee, for 1996 on the paper entitled, Effective Strength Eccentricity Concept for Inelastic Analysis of Asymmetric Structures, Journal of Earthquake Engineering and Structural Dynamics, Vol. 24, No. 1, January, 1995, p-69-84.
- Rackham Research Award, University of Michigan, USA, 1976-77.

ASSOCIATION WITH PROFESSIONAL BODIES

Prof. Ashok Jain also associated himself with several professional bodies, as

- Fellow, Institution of Engineers (India), Kolkata

- Fellow, Indian Association of Structural Engineers (IASE), New Delhi
- Life Member, Indian Society of Earthquake Technology (ISET), Roorkee
- Life Member, Indian Concrete Institute (ICI), Chennai
- Honorary Fellow, Indian Institute of Quality Management, Jaipur
- Life Member, I.I.T. Roorkee Alumni Association, Roorkee

SPIRITUAL ASPECTS

Dr. Ashok Jain was greatly influenced by the principles of Jainism, in particular by Paryushan, Anekantavada, and Syadvada.

Paryushan – It is a significant principle in Jainism, emphasizing self-discipline, spiritual purification, and deep introspection. It is a time for Jains to reflect on their actions, seek forgiveness, and strengthen their commitment to the path of non-violence (Ahimsa) and truth. Jain saints, with their profound spiritual wisdom, envisioned the principles of sustainable and eco-friendly development thousands of years ago. Their teachings emphasize:

- Non-Violence (Ahimsa): A deep respect for all living beings, advocating coexistence and minimizing harm to nature and ecosystems.
- Forgiveness (Kshamapana): Acknowledging one's mistakes and seeking forgiveness from others while also forgiving those who may have caused harm.
- Fasting (Tapas): Practicing self-control through fasting or dietary restraint which helps purify the mind and body.
- Scriptural Study (Swadhyaya): Delving into Jain scriptures (Agamas) to deepen understanding of spiritual teachings and ethics.
- Meditation (Dhyana): Engaging in mindfulness and meditation to cultivate inner peace and self-awareness.
- Non-Possessiveness (Aparigraha): Promoting detachment from material possessions, reducing overconsumption, and fostering mindful use of resources.

• Simple and Sustainable Living: Encouraging a lifestyle that minimizes environmental impact through frugality and conscious choices.

• Preservation of Natural Resources: Stressing the importance of conserving water, soil, and vegetation, and avoiding practices that harm the environment.

• Circular and Ethical Practices: Advocating for waste minimization, recycling, and reusing, long before these became global sustainability goals.

These teachings reflect a vision of harmony between humans and nature, offering solutions to modern environmental challenges. Jain philosophy reminds us that true progress is not only about technological advancements but also about living in balance with the planet and with each other.

Anekantavada - This principle emphasizes the idea that truth and reality are multifaceted. No single viewpoint can fully encapsulate the entirety of a concept or truth. Jain philosophy teaches that understanding all perspectives leads to a more comprehensive and balanced view of reality.

Syadvada - It complements Anekantavada by stating that truth is always conditional and context-dependent. The term "Syad" means "may be" or "in some respects", highlighting the importance of context in interpreting any statement or reality. It promotes the expression of ideas with humility and openness, avoiding absolute claims.

These principles encourage tolerance, critical thinking, and open-mindedness, forming the cornerstone of Jain philosophy and its approach to resolving conflicts or understanding complex issues.

FAMILY

Prof. Ashok K. Jain married to Sarita Jain in 1975. She is a post graduate in psychology from Meerut University. She is a home maker and loves cooking, sewing and music. She stitched cloths for baby Payal using patterns and beautiful fabrics bought

from Minnesota store while they were at the University of Michigan, Ann Arbor. The Jains are blessed with one daughter, Payal and a son Gaurav both of whom are engineers and currently residing in the United States. Payal is married to Vikash an expert in artificial intelligence and machine learning; Gaurav is married to Dr Savita, a biotechnologist from University of Roorkee and Jadavpur University, Kolkata; she is working on design of drugs for critical illness.



**In North Brunswick with
children and grandchildren November 2024**

About the Author



Dr. N. Subramanian,
Ph.D., FNAE

is an award winning Author, Structural Engineering consultant and Mentor, currently based at Maryland, USA, with over 45 years of experience in Industry (including consultancy, research, and teaching). He was awarded with a Edmund Friedman Professional Recognition Award by the American Society of Civil Engineers in 2024, a 'Life Time Achievement Award' by the Indian Concrete Institute and many other awards for his contributions towards Structural Engineering. He is the author of 25 books and over 325 papers, including the famous books on 'Design of Steel Structures', 'Design of RC Structures' and 'Principles of Space Structures' and the recent 'Building Materials, Testing and Sustainability'. (email - drnsmni@yahoo.com)

Publications For Sale		
Publications		
Sr. No.	Name	Rs.
1	Professional Services by Structural Design Consultant – Manual for Practice	250/-
Proceedings		
1	National Conference on Corrosion Controlled Structure in New Millennium	500/-
2	Workshop on Effective Use of Structural Software, 6th March, 2004	250/-
3	One Day Seminar on "Shear Walls In Highrise Building", 30th October, 2004	250/-
4	Seminar on "Innovative Repair Materials / Chemicals", 1st October, 2005	300/-
5	Seminar on "Foundations For Highrise Buildings", 23rd September, 2006	250/-
6	One Day Work Shop on "Pile Foundations", 20th February, 2010	250/-
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11	Any ISSE Journal Copy	100/-
Note : Additional courier charges for Mumbai Rs. 50 for outstation Rs. 100).		

NET ZERO BY DESIGN - MATERIAL MINIMALISM FIRST, TECHNOLOGY AND TRANSITION NEXT

By Dr. Prasad Marepalli, Aun Abdullah - Lodha

Preface

The conversation around carbon reduction in construction has largely revolved around material substitution replacing high-emission materials with lower-carbon alternatives. Instead, the focus should be on identifying and addressing inefficiencies in contemporary space planning and design approaches by adopting material minimalism, which prioritizes reducing material consumption before exploring substitutions. At its core, sustainability means asking only as much from nature as we truly need.

India faces a dual challenge: it must rapidly expand its built environment while simultaneously slashing carbon emissions. This is not just an engineering problem; it is a question of material security, strategic foresight, and climate responsibility. Simply replicating global trends will not work we must adopt solutions tailored to our unique context. The optimal strategy is to analyze nationwide material consumption and enhance design efficiencies for mass urban housing—maximizing every kilogram of material used. India's material security and growth depend on decarbonizing this scalable segment, with our previously published baseline study showing embodied carbon levels of 400–450 kgCO₂e/m² for such buildings.

This article explores how to achieve this shift through real-world examples and design methodologies. It concludes by outlining the ecosystem-level changes needed to mainstream this approach, ensuring that developers, architects, engineers, and policymakers align toward a low-carbon future. At Lodha, we have been at the forefront of this approach demonstrating that well-designed, purposeful buildings are not only possible but essential for reducing the carbon footprint. The time for material minimalism is now.

1. Introduction

The way we design and construct buildings has a profound impact on carbon emissions. While functionality and safety have traditionally been the foundation of design, the carbon impact of material use has often been neglected. For decades, structural design has been governed by codes and standards guided by two key aspects of strength and serviceability. These codes have served their purpose well, but sustainability must now hold equal weight. Designers must revisit foundational principles and initiate a shift in their approach to material consumption, promoting a philosophical change in the way the built environment is developed. Sustainability must now be embedded in every design decision, standing on equal footing with Strength, Serviceability, and Safety.

Structural form and efficiency are deeply connected. Designs that utilize direct load paths, regular geometries, and optimized structural schemes require fewer resources, resulting in lighter, more refined spaces. Simplicity is not just an aesthetic principle; it is the essence of sustainability. Educating the public is also essential to fostering climate consciousness and encouraging sensitivity toward the environmental impacts of complex, resource-intensive functional spaces.

For India, where the scale of future development is unparalleled, this shift is non-negotiable. We cannot afford to continue with carbon insensitive models of the past. Instead, we must lead with intelligence, balancing material security with climate resilience. This requires rethinking the way we approach building design, ensuring that innovation, performance, and sustainability are integrated from the start. The goal is clear: to usher in a new paradigm where efficiency and sustainability define the future of our built environment.

Lodha has been pioneering this design philosophy for over a decade, demonstrating that resource efficiency driven elegant solutions are the cornerstone of performance and sustainability.

Decarbonizing construction rests on three interdependent and overlapping layers of transformation:

1. Material Minimalism - The most immediate, cost-effective, and high-impact layer, reducing material use through sustainable design thinking. This layer can be addressed rapidly, delivering quick and substantial reductions in embodied carbon.

2. Low Carbon Technologies - A crucial but gradual process shaped by regulatory and supply chain constraints, safety considerations, and economic realities. This includes innovations such as low-emission concrete and steel, as well as recycled materials. Gains in this layer will materialize over time.

3. Clean Energy Transition - System-wide emission reductions across material production through cleaner energy sources such as renewables, hydrogen, carbon capture utilization and storage (CCUS), and electrification. Some portions of this layer can be leveraged quickly, but widespread transformation will take time.

For deep carbon reduction, these layers must be tackled in the right sequence. The first and third layers offer immediate opportunities that must be fully leveraged, ensuring that progress in the middle layer—though gradual—is significant enough to drive meaningful change. If material minimalism and clean energy shifts are not maximized early, the slow gains from low-carbon technologies alone will fall short of the necessary impact.

2. India's Urban Context

India's urban transformation is unfolding at an unprecedented scale—reports indicate that 100 million new homes will be needed over the next decade. The speed and scale of this development have few historical parallels, with only China's recent urban expansion coming close. In contrast, Western

nations urbanized over much longer periods. But India's growth is happening in an era where climate risks are already evident, making it impossible to follow the same paths as before.

This urbanization will be built primarily with reinforced cement concrete (RCC), the dominant material shaping India's cities. However, with cement and concrete responsible for nearly 40% of embodied carbon in buildings, the way we design and construct must evolve. Without addressing energy security,

material security, and climate security, the very foundation of India's development could be at risk.

The challenge, then, is clear: How do we build at this scale and speed while ensuring durability and minimizing lifecycle carbon emissions?

Shifting the Focus: The Median Matters

Discussions on sustainable buildings often focus on the exceptional—iconic or experimental structures that are too heavy, impractical, or unscalable. While these buildings may inspire awe and generate conceptual insights, they do not represent the bulk of real-world construction.

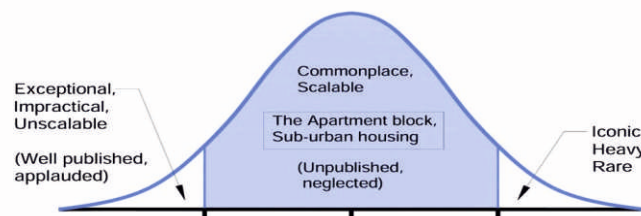


Figure 1 : Shifting the Focus - The Median Matters

Instead, our focus should be on the median—the apartment blocks, suburban owner-developed housing, and other commonplace forms of construction. This is where the real impact lies. Unlike the leading edge of innovation, where isolated breakthroughs offer easy wins, or the trailing edge, where solutions are too conceptual to scale, the median is where meaningful, scalable improvements must happen.

It is important to note that this is not a discussion on the well-established design practices of the structural engineering profession.

3. Creation of Enclosed spaces - Basic Structural Forms

Space is usually defined and enclosed by an architectural system imposed on a structural system. As an example, consider a high-rise office building consisting of light-weight exterior curtain walls and movable interior partitions fastened to a multistory structural frame. The frame must resist all applied loads including the weight of the walls and partitions, the live load, and the effects of the external environment. The floor system, which is usually a combination of structural and architectural components, completes the subdivision of interior space.

For a discussion on Basic Structural Forms, we refer here to the chapter on Structural Forms in the book entitled "Structural Engineering" cited in the first reference. Reference is also made to the chapter on the Brief History of Structural Theory cited in the second reference.

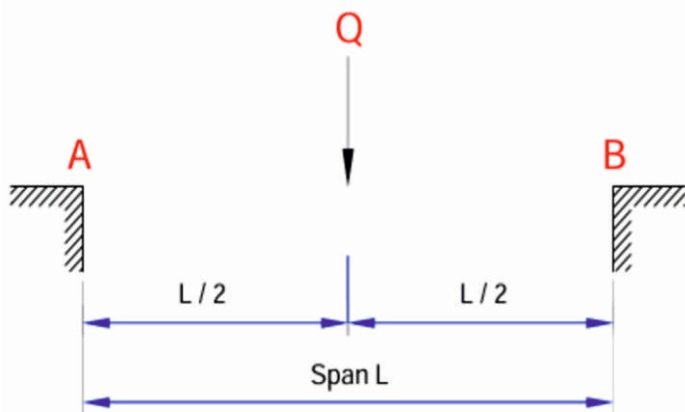


Figure 2 : Point Load from Space to Supports

The ultimate role for any structural system is that of transmitting forces through space from the source of load to the foundation. The technical success of the system depends on how efficiently this flow of load is accomplished. As an illustration, let us consider a simple case of transferring a point load from space to the supports A and B as shown in Figure 2. The basic structural forms from the standpoint of force transmission through space can be classified as follows:

3.1 Tension or compression structures

In tension or compression structures, the load is transmitted by a single state of stress as shown in Figures 3(a) and 3(b). The pure tension structure is form-active in that it takes on a certain geometry for any given loading. It provides a highly efficient usage of material. The compression structure also can be quite efficient, but its load capacity is usually limited by buckling rather than by the inherent strength of the construction material.

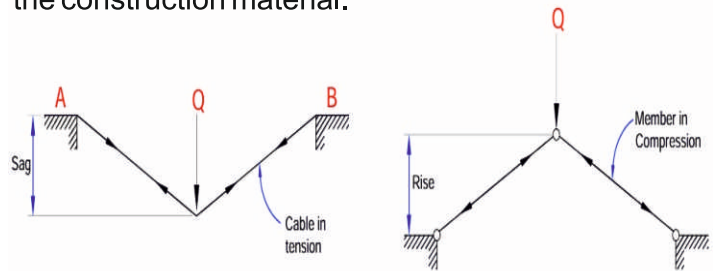


Figure 3 (a) : Tension Structure Figure 3 (b) : Compression Structure

Tension Structures: A tension structure redirects the applied loading to the supports by tension alone in the primary members of the structure. It requires a construction material with high tensile load capacity. The shape of a tensile structure is a unique function of the magnitude and position of the applied loads.

Compression Structures: There are two simple structural forms suited for carrying forces by compression alone - the column and the arch. A column is a straight member loaded along its centroidal axis with a compressive load. Except when it is extremely short, the column is less efficient than a tensile member because it has the tendency to buckle when compressed. The ideal arch form for a given loading is the inverse of the funicular shape. It can be built from materials that have high compressive strength, and it must have sufficient stiffness to prevent buckling.

3.2 Structures with tension and compression elements (Truss Form).

The truss, made up of a pinned assemblage of members, carries variable loadings through the mechanism of varying magnitude of the member axial forces. It has excellent efficiency and is usually very stiff.

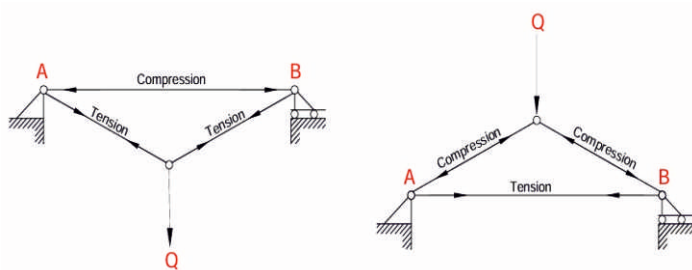


Figure 4 : Tension and Compression Structure (Truss Form)

A truss is a triangular form with both tensile and compressive elements. The force transmission is provided by redirection of the loads into a series of forces in equilibrium with each other and any external loads at each hinged joint. The truss always consists of a number of straight components with roughly half in tension and the other half in compression. Any number of geometrically rigid triangles can be interconnected to give a stable configuration.

If loads are applied only at the joints, it does not have the undesirable bending in members. The assemblage of members is capable of redirecting any conceivable system of joint loads to any proper set of support points. Finally, the number of truss members and their precise configuration are design variables that give great flexibility to the engineer in shaping the structure to fit the specified problem at hand.

3.3 Structures Transmitting Loads by Bending Action

If user space requirements necessitate more clear heights above and below the truss, truss form is not feasible because the forces in the members grow rapidly as the height of the truss is decreased. A shallow truss might be considered as a possible solution, but we must be aware of what a decrease in truss depth does to the forces in the truss members.

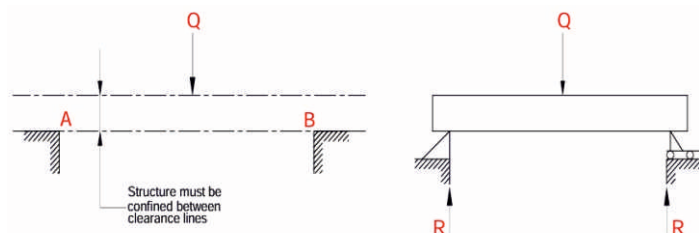


Figure 5 : Bending or Flexural Member

Although a very shallow truss is theoretically feasible, there will be a large number of joints and individual members in the truss, and the cross-sectional area of each chord member will become large. The truss can be replaced by a solid element, called a beam in which the top portion of the beam acts as a compression chord and the bottom portion as the tension chord. In addition to resisting the tension and compression forces, the beam fibers also must carry the forces that would have been resisted by the truss verticals and diagonals.

Bending or flexural structures, in which load normal to the member is transmitted along the member by bending action. The typical bending structure is not as efficient as a pure tension or compression structure, but it remains one of our most widely used forms because of its simplicity and adaptability to almost any situation.

Bending action is also the primary load-carrying mechanism in slab floor systems. A slab can be viewed as a continuum of beam elements, spanning in either one or two directions to supporting walls or girders.

4. The Need for Controlling Flexure in the Structural System

A variation of the basic beam form is the frame, made up of a number of beam and column elements. A sizable percentage of modern construction is dependent on the frame form, even though it is often less efficient structurally than other forms. The clear rectangular openings afforded by a conventional frame make up highly functional spaces.

The precise configuration of a multistory, three-dimensional frame is influenced strongly by gravity loads and lateral loads. The frame form is often clubbed with core walls for efficient transfer of lateral shear. The horizontal lateral loadings are transmitted to the foundation of the building by bending and shear action of the core walls. The vertical members of such structures must carry both the gravity-induced compressive loadings as well as bending action induced by the gravity and lateral loads.

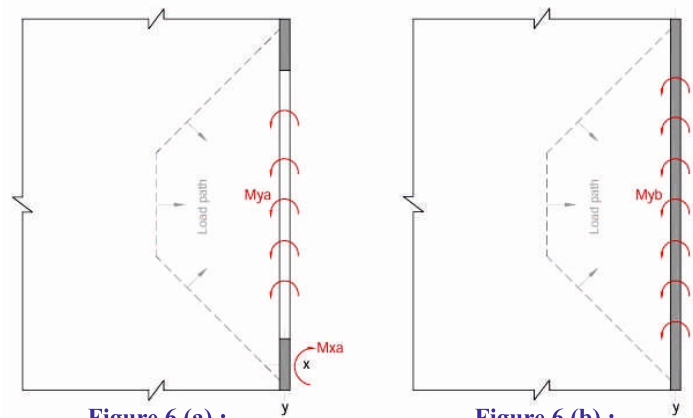
An increased appreciation of form will come with a better understanding of structural behavior. Structural engineers shall address the below three key questions in proposing best structural system for any given situation:

1. How does the structure transmit its loads to its supporting foundation?
2. What type of deformations and stresses are produced by the force transmission?
3. How could the form be improved for material efficiency without compromising its function and aesthetic appeal?

Goal of structural engineer is to utilize the material employed to the maximum structural advantage. A rectangular beam member is less efficient compared to utilization of material in the pure tension or compression members. Hence different geometrical shapes were developed viz. I sections, tubular sections to maximize the moment of inertia for use in design. However in the cast in situ RCC buildings, it is common to use rectangular sections considering the ease of forming.

From the above discussion it is clear that the structural engineer shall focus on ways to reduce the degree of bending in a multi story structure for enhancing the material utilization efficiencies. Attention shall be paid at system level optimization for achieving the goal. When forces flow naturally, materials perform at their peak. This principle, though simple, demands a fundamental shift in how we conceptualize structural framing.

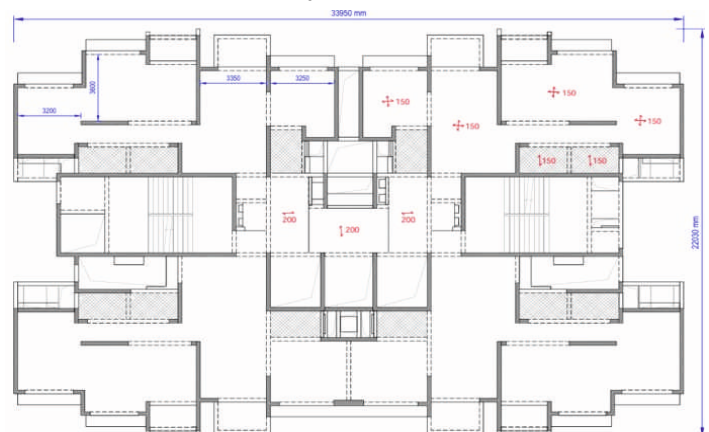
To illustrate the concept, consider two scenarios: (1) a slab supported on a beam-column frame, as depicted in Figure 6(a), and (2) a slab directly supported on a structural wall, as shown in Figure 6(b). In the beam-column framing, the beam and column sections must be designed to withstand the localized moments, denoted as M_{x1} . Conversely, when the slab is supported by walls, a wider slab section is designed to resist the bending moment per unit length, denoted as M_{y2} . It is important to note that M_{x1} is significantly larger than M_{y2} , and generally, this moment M_{y2} falls within the slab's moment-resisting capacity.



**Figure 6 (a) :
Slab supported on
Beam-Column Frame**

**Figure 6 (b) :
Slab supported on
Shear Wall**

Figure 7 shows a floor framing for a G+24 story high-rise building with distributed shear walls. which is an extension of the concept illustrated above.



3. Shorter spans eliminate the need for internal beams within the units, enhancing both aesthetic appeal and reducing formwork costs and construction time.

4. Shifting to a distributed wall system results in larger concrete capacities in vertical members than required for strength, but this helps optimize the amount of steel reinforcement needed.

5. Additionally, smaller spans improve the performance of wet areas by reducing the risk of leaks, contributing to more durable and maintenance-free structures.

Finally, a note on seismic performance. While distributed walls may seem structurally redundant, they experience lower stress levels from gravity and lateral loads. Consequently, the resulting compression and tensile stresses, as well as the associated strains, are on the lower side, leading to overall material savings in reinforced concrete high-rise buildings. Lower axial strains indicate greater inherent ductility in the members, which is highly desirable for improved seismic performance.

The above illustration aims at bringing attention to the fundamental principles for achieving the low-carbon structural design.

5. Levers for Material Minimalism in Design

1. Direct Load Paths to the Foundations

- Efficient structural systems are those that channel loads directly to the ground with minimal redirection or transfer. Just as tree roots provide a direct and efficient path for distributing weight into the soil, a well-designed structure should ensure that gravity and lateral loads flow across the full height of the structure, maintaining a consistent load path uninterrupted to the foundation.
- A crucial strategy for achieving this efficiency is to eliminate transfer structures, such as transfer slabs and deep transfer beams, by maintaining consistent functional use across different levels and avoiding abrupt changes in occupancy requirements.

2. Controlling Flexure in the Structural System

- When designing structural systems, transition from framed structures with core walls to distributed wall systems.

- Smaller spans are preferable, as the design moment increases in proportion to the square of the span length

- In smaller homes, such as affordable housing, slabs can span directly onto walls, eliminating the need for beams entirely.

- In premium housing projects with larger spans, voided slabs, with or without post-tensioning, can significantly reduce material consumption.

- Composite floor systems with steel beams are often highly effective for commercial floors with large lease spans.

- A three-car span offers greater material efficiency than a four-car layout when optimizing parking grids.

3. Achieving Regular Geometries and Symmetry

- The most efficient structural forms are often the simplest, as a well-balanced design reduces stress concentrations and optimizes material usage.

- Avoiding vertical and plan irregularities helps prevent the need for additional reinforcement to counteract uneven force distribution.

4. Designing for Durability

- Concrete is inherently prone to cracking, so exposed and wet areas require careful consideration in floor framing design to minimize tensile strains.

- Applying post-tensioning to keep cantilever beams and slabs uncracked enhances durability, especially for exposed decks.

- A durable, leakproof structure minimizes the need for repairs, reducing additional material consumption over its lifespan.

- Material efficiency in a structure is not just about the initial usage but also about its longevity and durability.

Impact of these levers on Embodied Carbon

At Lodha, we have consistently maintained an A1–A5 embodied carbon (EC) of 400–450 kgCO₂e/m² by applying the strategies outlined

above. This is supported by our EC baselining and repeated measurements across projects. Our approach includes the use of widely adopted low-carbon materials such as supplementary cementitious materials (SCMs), recycled steel, AAC blocks, and other circular supply chain components.

The Indian Green Building Council (IGBC) Net Zero Carbon Rating System caps embodied carbon at 700 kgCO₂e/m² for certification. A Near Net Zero Carbon rating requires a 75% offset, while Net Zero Carbon demands a 90% offset. The RIBA 2030 Challenge targets 540 kgCO₂e/m² by 2030, down from 675 kgCO₂e/m² in 2025, factoring in maintenance and end-of-life emissions. Adjusted for construction-stage emissions, this equates to 380 kgCO₂e/m². The ILFI Net Zero Carbon Buildings standard sets a 500 kgCO₂e/m² benchmark, allowing carbon credits to achieve net-zero status.

We are ready to advance decarbonization through pilots and scaled deployment, leveraging advanced technologies, optimized material mixes, and innovative solutions. However, realizing these solutions requires a collective effort across the entire ecosystem.

Crucially, material efficiency begins with better design, not just better materials. Integrating these four levers into the early design process allows buildings to minimize embodied carbon before even selecting low-carbon materials or alternative construction methods.

6. Ecosystem Development

For material minimalism to become mainstream, the entire ecosystem must evolve in sync, aligning policy, industry practices, and market forces to make efficiency a defining principle of construction.

- Building Codes - Building codes shall incorporate prescriptive measures for sustainability.
- Policy & Regulation – Incentivizing resource-efficient projects through tax relief, and flexibility on

the regulations, etc. For instance, if site constraints lead to a shortfall in required parking, forcing the construction of a basement with heavy transfer structures, the developer should have the option to forgo those additional units and instead utilize or sell TDR.

- Industry Awareness – Engineers, architects, and developers should champion material minimalism, viewing efficiency as progress rather than a limitation. Training programs, workshops, and design competitions can accelerate this shift and embed it into mainstream practice.
- Market Demand – We must cultivate market demand for efficient building design by actively promoting the value of sustainability to owners and buyers. Implementing financial incentives, like preferential interest rates or subsidies for buildings exceeding code requirements, will effectively stimulate this demand.

A well-orchestrated push across these levers will redefine material use in construction. Lodha has been at the forefront of this movement, demonstrating that smart design can deliver sustainable, high-performance buildings. With the right policies, industry engagement, and market demand, this approach can become the new standard for construction in India and beyond.

7. Conclusion

Decarbonizing construction rests on three interdependent and overlapping layers of transformation - Material Minimalism, Low Carbon Technologies, and Clean Energy Transition. Material minimalism can provide immediate gains by following the levers identified in this paper.

India's material security and growth critically depends on decarbonizing the scalable, commonplace segment of urban housing. However, meaningful changes are required to bring in alignment across the entire ecosystem. Policy must incentivize efficiency, professionals must embed it into practice, and market forces must reward it.

Lodha's experience shows that this transformation is both possible and necessary. By prioritizing material efficiency, baselining embodied carbon, and working with the supply chain to adopt lower-carbon solutions, we see a clear path to reducing embodied emissions significantly. These strategies, applied at scale, can fundamentally reshape the country's carbon footprint.

This paper is part of an ongoing series that will delve deeper into key examples and case studies to drive further discussion.

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the Group's comprehensive
sustainability strategy.



**Happy Diwali
to
ALL ISSE MEMBERS**

NEWS AND EVENTS DURING JULY – SEPT 2025

by Er. Hemant Vadalkar

11 July 2025 : ISSE New Mumbai function with IEI and TATA Steel.

ISSE Navi Mumbai local centre arranged a technical lecture on Tall building design. Er. Ranjith Chanduni who is a member of code committee (IS16700) on Tall buildings, explained the critical aspects of tall building design and structural planning. Chief guest Er. Jayant Kulkarni shared his experience on design of tall structures and climate change mitigation measures. Parag Raut explained the use of steel weld mesh for faster construction of floor slabs and saving of time and cost in the project. The function was attended by more than 100 engineers. The programme was supported by TATA Steel.



19 Jul 2025 : Epicons friends of concrete arranged a webinar on Design of Tall building for wind and seismic forces. Prof. (Dr.) Lakshmy Parmeswaran (Chief Scientist, CSIR-CRRI, New Delhi) explained wind effects on tall buildings of different heights and wind load calculations. Prof. (Dr.) Yogendra Singh (Head, Department of Earthquake Engineering, IIT Roorkee) talked on seismic hazard, seismic load calculations and revisions in capacity design codes.

26 Jul 2025 : ISSE Student chapter webinar series.

ISSE student chapter coordinator Vivek Abhyankar invited Shekhar Vaishampayan, a geotechnical consultant to talk on importance of geotechnical investigations – planning and interpretation. Mr. Vaishampayan explained procedures for carrying out field tests and laboratory tests as a part of geotechnical investigations. He shared some case studies and answered the questions raised by the students.

4 Aug 25 : ISSE arranged R. L. Nene memorial lecture on web platform. Senior engineer and ISSE Trustee Umesh Dhargalkar addressed the gathering and shared his experience on Redevelopment of buildings projects. He talked on Redevelopment Project Management

Consultancy - A Great Opportunity for Civil Engineers. He touched upon the planning required for the redevelopment projects, agencies involved, their role, precautions to be taken, funding, viability of a project and selection of right agency for the work.

8 Aug 2025 : ISSE Kalyan Dombivli local centre in association with TATA steel arranged a technical lecture at Dombivli. Mr. Vivek Abhyankar explained method of formwork design for concrete structures. Parag Raut from TATA Steel talked on mechanized reinforcement for faster construction. Function was attended by more than 150 engineers. Team ISSE KDLC worked hard in organizing the event.



22 Aug 2025 : ISSE Sambhajinagar in association with Association of Civil Engineers (P) and Ultratech Cement conducted a technical lecture on Structural health monitoring transforming the future of infrastructure maintenance by Er. Ajay Kumar Sreerama, Director Mantis Infra Solutions P Ltd. ISSE Chairman Shilpa Danekar was instrumental in arranging this function.

25 Aug 2025 : ISSE Kolhapur centre had a technical lecture on Concrete rebar fixing and rock anchoring solutions at Sangli. The function was supported by ICFS, Kolhapur. Professors from Walchand college of engineering Shri Gharpure, Dr. AB Kulkarni and Dr. Patankar were felicitated. Prashant Hadkar and team ISSE Kolhapur was instrumental in arranging this event.



29 Aug 2025 : ISSE Baramati local Centre in association with Adani Cement arranged a technical talk on Advancement in concrete by Chandrashekar Nidhonkar.

30 Aug 2025 : ISSE student chapter webinar series . A lecture by Deepak Gaikwad (Head QAQC–L&T Construction) was arranged on 53m PSC box girder and 125m Steel Girder a case study from Zuari and Mandovi Bridge at Goa for Konkan Railway.

30 Aug 2025 : ISSE Baramati local centre arranged a webinar on Structural health monitoring and energy harvesting using PZT sensors by Prof. Dr. Chittaranjan Nayak, Head Civil Engineering Department VPKBET, Baramati.

Aug 2025 : Report of the Expert Safety Committee: Special Safety Control Recommendations for Working at Heights During High Rise Construction

The construction of high-rise buildings in Mumbai has accelerated in recent years, bringing both opportunity and heightened safety concerns. Following a series of crane-related accidents and incidents of falling debris, the Hon. Bombay High Court constituted an Expert Safety Committee to examine these risks and propose enforceable safety measures.

After a year of deliberations, site studies, and examination of international codes, the committee has released its comprehensive report, “Special Safety Control Recommendations for Working at Heights During High Rise Construction.”

Er. Ranganath Satam, Honorary Secretary of ISSE, elaborated on the society's mission and the various activities

Committee and Contributions

The report is the outcome of a collaborative effort by distinguished professionals, each bringing expertise from architecture, engineering, law, and construction practice. The committee members were:

- Mr. Amol Shetgiri, Architect, Managing Partner – Shetgiri & Associates
- Mr. P. G. Redekar, Chartered PMC & CMC, Certified Arbitrator, Approved Valuer
- Mr. Roshan Bhoir, Assistant Engineer (Building Proposal)
- Mr. Vikraman Pillai, Civil Engineer (MS, USA), MBA, Project Director for one of India's tallest towers
- Adv. Mridul Sharma, Solicitor, Bombay High Court and Supreme Court of India
- Dr. Shashank Mehendale, Structural Engineer; Member, High Rise and Heritage Committees

- Mr. Girish David, Structural Engineer; Chairman, CTBUH India; Member, ERP MCGM

The Indian Society of Structural Engineers (ISSE) appreciates the committee's collective effort, which demonstrates an exemplary commitment to public safety and sets a benchmark for technical collaboration in the service of society.

Aug 2025 : Appointment of En. Umesh Joshi to the Knowledge Task Force

With great pride and purpose, the Indian Society of Structural Engineers (ISSE) announces the inclusion of En. Umesh Joshi, Partner at JW Consultants, in the Association of Infrastructure Industry(India) Knowledge Task Force, a dedicated group of experts and professionals committed to transforming the future of construction and infrastructure in Bharat

En. Joshi will be contributing his expertise on Structural Problems and their Resolutions in High Rise Buildings. With decades of experience, he brings deep technical insight into challenges faced in high-rise construction and the innovative solutions required to ensure safety, stability, and sustainability.

Through his role in the Knowledge Task Force, En. Joshi is advancing knowledge sharing across the engineering and construction community, building capacity for the next generation of professionals, and strengthening the skilling and upskilling of engineers, architects, and infrastructure practitioners nationwide.

The ISSE acknowledges and appreciates his commitment to progress and celebrates his invaluable contribution to shaping a stronger and more resilient Bharat.

Congratulations Umesh Joshi!!!



Aug 2025 : Appointment of **Prof. (Dr.) Vijay Gupchup** as **President of NICMAR University, Pune**

The Indian Society of Structural Engineers (ISSE) is pleased to acknowledge and congratulate Prof. (Dr.) Vijay Gupchup on his appointment as the President of NICMAR University, Pune.

Prof. Gupchup is widely respected in academic and professional circles for his distinguished contributions to

engineering education, institutional leadership, and capacity building within the construction and infrastructure sector. His career reflects a lifelong commitment to advancing technical excellence and fostering innovation in higher education.

In assuming this new role, Prof. Gupchup brings with him a wealth of experience and a vision that will guide NICMAR University in preparing the next generation of engineers, managers, and professionals. His leadership will further strengthen the University's position as a premier institution dedicated to construction, infrastructure, and project management education.

The ISSE commends Prof. Gupchup's dedication to advancing knowledge and extends its best wishes for his continued success in shaping the future of infrastructure education in India. Congratulations Dr. V N Gupchup for becoming President NICMAR University Pune.



1 to 9 Sept 2025 : Online faculty development programme was arranged by Department of Civil Engineering , Bharati Vidyapeeth Institute of Technology, Navi Mumbai. Many ISSE members were called as resource persons. Dr. Mohan Dagaonkar, K.K. Varkhedkar, V. C. Kamble, Hemant Vadalkar, Prakash Bajaj shared their experience.

8 Sept 2025 : Lecture on Finite Element Method by Prof. D N Buragohain arranged by ISSE in association with VJTI Structural Engineering Department.

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8 Sept 2025 : Lecture on Finite Element Method by Prof. D N Buragohain arranged by ISSE in association with VJTI Structural Engineering Department.



Prof D N Buragohain's lecture was one of the most memorable lectures in several years. I do not know whether young engineers appreciated it in same way. With million times of computing power in their hands they use brute force methods without second thoughts. However the brute force has its limitations in getting results. The words they should remember are singularity (division by zero error in analysis), hand calculation checks and substructure. When brute force method goes out of hand typical analysis can take several hours. This prevents user to use proper sizing of members and efficiency. I think they need to understand and master all three.

Some of the nuggets I got from the lecture are as follows-

Once you know operating differential equations, getting solutions is easy. This goes beyond the stiffness matrix formation method. It shows his power in looking things in pure mathematics.

Symmetric and anti symmetric boundary conditions.

Least square method for surface modelling and reducing points to elements.

For every problem discussed, there was an independent programming need. The way he achieved shows a mastery over programming.

Using pen plotters to stop hidden lines from appearing- by writing a programme..

Investigating falling concrete in prestressed dome and innovative model with a single compound element joined by interface element to check tension.

His opinion comparison on 8 noded element with triangular element.

The error in reactions with offsetted support condition in STAApro software.

Building configuration with very odd shapes - The problem of "damaged brain type building".

The problem of construction sequence loading on 130 meter arch bridge with steel frame truss and concrete deck. During the concreting in small segments, the loading on the arch was not symmetrical and there was local bending. So the arch could not remain in compression as desired as per design assumptions. This was the lesson learned that design assumptions may not be valid during actual construction. Finally the steel arch bridge was to be supported by additional supports to complete the work.

His one line answer to two questions raised for solving half the structure due to size limitations and stage construction analysis was - Multiple analysis is required. –

- Note by Pramod Sahastrabuddhe



13 and 14 Sept 2025 : ISSE Kolhapur conference

ISSE Kolhapur centre organized two days conference on 13-14 Sep 2025 at historic Panhala Fort. The theme was Innovations in Structural Engineering. More than 120 civil and structural engineers attended the conference. It was a good knowledge sharing experience. Experts shared their experience with case studies on challenges faced. Various topics like Structural design , durability, flat slab construction, duties and responsibilities of structural engineer, legal aspects were discussed during the conference. Prof. Shirang Kamble (Railway Training Institute), ISSE President Hemant Vadalkar, Achyut Watve (J+W) , Narayan Kochak, Shivdatta Patne, Dr. Mahesh Varma , Prof. M G Gadgil, Prashant Hadkar, Prashant Haval, Suresh Bacche(Techno legal consultant), Vijay Devi, Chetan Patil shared their experience. Sponsors Tata Blue Scope , SCON Infra, Kalika Steel , Tata Structura , Ultratech Cement , Stonevilla, ABHUA supported the event. All the office bearers of ISSE Kolhapur local centre and organizing committee Prashant Hadkar, Mandar Ambekar, Jiya Momin, Prashant Haval, Niranjana Waichal, Pise, Bane, Rashmi Jadhav and their staff worked hard to make the event successful. Evening entertainment programme along with excellent Kolhapuri food and stay at Hotel Hill Top made the event memorable.



15 Sept 2025 : Engineers' Day was celebrated at SBPCOE, Indapur in association with ISSE Baramati centre and sponsored by Adani Cement.

A One-Day Workshop on "Quality Control in Concrete Structures" featured expert sessions by Er. Ramesh Rathod and Er. Mukund Gaikwad.

The event also witnessed the signing of an MoU between ISSE BRC and SBPCOE to strengthen industry-academia collaboration.

15 Sep 2025 : ISSE Indore Centre Celebrated the Engineer's Day. Guest of Honour was Er Shankar Lalwani , Member of Parliament , Constituency Indore Madhya Pradesh, India.



19 Sept 2025 : ISSE Indore centre in association with ASE, ACCE and UltraTech Cement arranged a lecture on Pile design and IS code specifications by Mahesh Gupta.



20 Sept 2025 : ISSE KDLC function at Dombivli

ISSE Kalyan Dombivli local centre celebrated Engineers' Day 2025 in association with Indian Institute of Architects (IIA), Rotary club of Dombivli East and Ultratech Cement.

The theme was "A Step Towards Sustainability". The event marked a significant milestone in highlighting the growing importance of sustainability in our everyday lives.

KDLC chairman Er. Madhav Chikodi informed about local centre activities. ISSE President Er. Hemant Vadalkar elaborated on ISSE's activities and stressed the importance of community and business-led sustainable practices.

The Chief Guest of the function was KDMC Commissioner Er. Shri Abhinav Goyal.

Hon. Commissioner Goel, who is himself a Civil Engineer from IIT, Kanpur, in his address, spoke about KDMC's ongoing and upcoming environmental projects, calling upon institutions and organizations to contribute innovative ideas for a sustainable future. The guest of honour was Rtn. Kedarnathrao Ghorpade, former MMRDA Chief Planner.

Er. Prashant Bhagwat (Ex. Engineer, KDMC) spoke on steps taken by the corporation towards solar energy, Er. Aparna Bhandarkar from UltraTech shared insights into eco-friendly products which has less carbon footprints, Ar. Aaditya Agte presented a case study of green building showing various aspects of green building certification and how small steps can be taken to construct a green building, right from excavation to control of tap flow of a wash basin of a flat. Lastly, Ar. Kedarnathrao Ghorpade spoke on Micro to Macro, which was thought-provoking perspectives on day-to-day activities.

The program was well conducted by ISSE-KDLC secretary Er. Srinivas Mudaliar. The program witnessed a record participation of 165 attendees.



27 Sept 2025 : Epicons Friends of Concrete in association with VJTI and ICI arranged a work shop on Role of Engineers and Architects in Climate change mitigation at VJTI.

Ar. Swati Chokshi Principal In-Charge, Academy of Architecture spoke on

Life Cycle Assessment for Buildings – WBLCA & Carbon Assessment.

Er. V. R. Kulkarni Founder, (GCCA) elaborated on Comparative Evaluation of Embodied Carbon of High –Rise & Low- Rise Building in India. Asst. Prof. (Dr.) Ninad Oke, VJTI. talked on Green Infrastructures & Climate Change Mitigation. Er. Jayant Kulkarni – MD/Er. Anand Kulkarni – Director discussed about Climate change Mitigation – Approach of ISO 9001-2015 Clause no. 4.1.,4.2. Er. Abhijeet M. Kulkarni – Director Structures Burro Happold expressed his views on Role of Structural Engineers. Er. Ajit Kulkarni –MD, Ajit Kulkarni Consultants Pvt. Ltd. Discussed MEP Services Contribution in Climate Change Mitigation.

and Dr. Yogini Deshpande(ICI), Technical Director Renuka Consultants(Explorers & Designers) Pvt. Ltd talked on Design and Asset Management perspective. Function was attended by about 150 engineers.

27 Sept 25 : ISSE Student chapter webinar series

Mr. Bhavik Dharmi, specification engineer from M/s FOSROC chemicals was invited to talk on construction chemicals – Overview and Repair case studies.

30 Sept 2025 : ISSE Baramati centre arranged a lecture on Sustainable Cement and Steel Production in India- Need, Challenges and future pathways by Prof. Dr. Dunwant Kate, Head Civil Department SVPM's college of Engineering, Malegaon, Baramati.

Edited and published by Vatsal Gokani for ISSE, C/o, Maansi Nandgaonkar, 101, Sunflower, Sakharam Keer Road, Shivaji Park, Mahim, Mumbai - 400016. Tel 022-2431 4423. e-mail issehq@hotmail.com Web : www.isse.org.in for private circulation and printed by G. B. Gawde, 142 Anand Estate, S. G. Marg, Chinchpokli, Mumbai 400 011.

Reinforcing the Future: How Tata Steel's Sm@rtFAB Enabled Fast - Track Construction at Vijaybhoomi University

India's construction landscape is evolving rapidly. With tighter deadlines, labor constraints, and a strong push for Infrastructure, Institutional & Residential Building construction, modular and precast technologies are no longer optional they're essential. Tata Steel's Sm@rtFAB, a welded mesh reinforcement solution, has stepped up as a game changer in this space.

In the foothills of Karjat near Mumbai, an ambitious construction project is quietly setting benchmarks for India's fast-evolving building technologies. The Vijaybhoomi University Hostel, a seven-storied modular structure with capacity for 428 beds, is emerging as a textbook case of how innovative reinforcement solutions like Sm@rtFAB can address tight timelines, labor shortages, and the growing demand for precision.

The project, undertaken by Hommission a leader in 3D volumetric precast construction aims to be completed in a record 120 days, ahead of the university's next academic session. But with limited skilled labor in the region and high accuracy requirements for precast modules, traditional steel reinforcement methods simply wouldn't cut it.

With relentless design work from Edifice a Chennai-based Structural Consultant the entire reinforcement was reimagined from conventional TMT bars to fully engineered and customized Welded meshes. Tata Steel's in-house design & detailing team worked closely with the Structural consultant through multiple iterations to arrive at an optimal solution. After rigorous deliberations and technical validation, Welded mesh was approved not just for its typical slab and wall reinforcements but also for the first time for critical applications like Raft Foundations and Kerb Walls.

Each mesh was meticulously engineered to exact dimensions, ensuring zero wastage at site and optimal steel utilization. In addition, each mesh sheet was tagged with specific identification codes, significantly improving traceability and on-site installation productivity. This high level of customization also enabled the use of non-standard diameters like 7mm, 9mm, and 11mm, offering a unique advantage in steel savings without compromising structural performance a hallmark of Tata Steel's differentiated Sm@rtFAB offering.

The Sm@rtFAB solution, designed as a pre-engineered welded mesh, offered speed, consistency, and modular adaptability perfectly aligning with the project's needs.

However, innovation didn't come without its trials. Initial mesh designs exceeded 400 kg per sheet, pushing factory equipment to its limit and raising handling concerns. A smart redesign featuring double-layered mesh at wider spacing preserved the required steel volume while ensuring safer and more efficient production.

A core strength of Tata Steel's offering was its comprehensive design and detailing support. From early-stage engagement, the design team provided structural inputs, optimization studies, and detailing services that helped eliminate rework and reduced ambiguities at the site. This integrated approach ensured that even complex construction elements were covered with precision.

To secure buy-in from all stakeholders, Tata Steel's team deployed a step-by-step approach progressing from 2D drawings to 3D BIM models with a focus on clash detection, especially at critical junctions such as Kerb Wall placements over Raft mesh. A full-scale mock-up further helped in visualizing complex reinforcement arrangements and gaining critical stakeholder approvals.

Post-approval, the real test came on-site. With dedicated after-sales support including training for site engineers, SOPs for installation, and coordinated logistics labour productivity increased 3X and reinforcement timelines were reduced by one-third. In fact, ~18 MT of reinforcement work was completed in just four days with only six workers a 65% productivity gain compared to conventional methods.

This project doesn't just stand for speed it's a glimpse into the future of precision-driven, prefabricated construction, where time, accuracy, and innovation intersect. Tata Steel's integrated supply model offering both ReadyBuild (cut & bend TMT) and Sm@rtFAB (engineered mesh) solutions ensures high flexibility and smoother execution for customers working on diverse structural needs.

Finally, Sm@rtFAB exemplifies Tata Steel's commitment to Safety, Sustainability, and Quality bringing efficiency, consistency, and responsible construction practices to the forefront of India's built environment.

As urban infrastructure evolves, solutions like Sm@rtFAB will play a crucial role in meeting India's growing demand for smarter, faster, and more efficient buildings.

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