Capstone

Commitment | Excellence | Innovation

Value beyond the ordinary

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Company Profile

Capstone is a civil & structural engineering firm founded in 2005 in Mumbai. From a small beginning, the firm has grown to a team of more than fifty members now consisting of civil & structural design engineers, CAD technicians, project managers, NDT engineers & technicians and structural inspection engineers.

We also have an in-house construction material testing laboratory (NABL accredited) with advanced Non-destructive and Semi-Destructive testing equipment. Our expertise in non-destructive testing is being used by clients such as Tata Projects, Tata Steel, Larsen & Toubro and Reliance Industries regularly in their projects across India.

Services Offered

- **Civil & Structural Design for New Construction**
  - Industrial Plants/ Warehouses
  - Residential Buildings
  - Commercial / Institutional Buildings
  - Power Sector - Electric Substations, Solar & Wind Energy
  - Infrastructure – Highways / Bridges / Airports / Municipal Structures / Telecom

- **Structural Assessment & Retrofitting Design for all types of Buildings**
  - For additional loads
  - Change in usage
  - For Pre-Purchase / Lease decision making
  - For seismic preparedness
  - Periodic Health Monitoring

- **Non-Destructive Testing**
  - Reinforced Concrete Buildings
  - Steel Structures
  - Wood / Stone Masonry Heritage Structures

- **Consulting services for Repair Works**

Project Snapshots

Cyclone Replacement IOCL, Vadodara

Wind Turbine Towers Design

Royal Terrace Apartments, Geurnsey, Channel Islands

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Founder Profile

Rahul Agarwal
B.Tech. (IIT Bombay), M.Tech. (IIT Bombay)

Capstone is headed by Mr. Rahul Agarwal who has done both his graduation and post-graduation in civil & structural engineering from IIT Bombay and has more than 15 years of experience in providing engineering services to the company's clients.

Apart from carrying our structural design for a large number of Indian projects, he has also provided his expertise in many projects located outside India, in USA, UK, Bhutan, Nicaragua, Brunei, Australia, Italy, Afghanistan, UAE, St. Kitts & Brazil. Hence his global knowledge of civil & structural engineering codes & practices is regularly used for our projects in India.

Rahul's other interests include design of temporary scaffolding structures. He has conducted training sessions for engineers of Reliance Industries to help them design and use scaffolding. He has also designed scaffolding for Mumbai Metro project. Rahul has also served as a jury member for the CREDAI Bengal Realty Awards.

Advisor

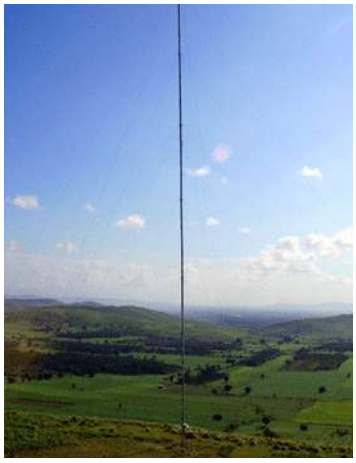
Dr. Alok Goyal
Professor IIT Bombay

Dr. Alok Goyal is one of the leading authorities on structural engineering in India. Apart from having numerous research publications, he is a consultant to a large number of government organizations such as ONGC, DRDO, Indian Railways and MMRDA. He is consulted by the most reputed Indian companies, real estate developers and engineering consultants for his innovative and practical approach to various structural engineering problems. Dr. Goyal is also a member of the review committee for Indian Standards.

Project Snapshots

Fabrication Plant
Bkkoks, Bhilai

Iron Ore Pellet Plant
Godawri Power & Ispat Ltd.



Guyed Wind Masts

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Civil & Structural Design Services

- High and Mid Rise Buildings
  - ❑ RCC, Steel & Composite construction
- Industrial Structures
  - ❑ Warehouses
  - ❑ Petrochemical Plants
  - ❑ Manufacturing Plants
  - ❑ Electric Substations (GIS / AIS)
  - ❑ Piping & equipment support structures
  - ❑ Foundation design for equipment
- Infrastructure
  - ❑ Design of Road pavements, Geometric planning
  - ❑ Highway & Railway bridges
  - ❑ Airport Buildings
  - ❑ Water & Wastewater treatment plants
  - ❑ Telecommunication Towers, Wind Masts
  - ❑ Solar Power Plants
  - ❑ Wind Turbine Towers
- Peer Review & Value Engineering

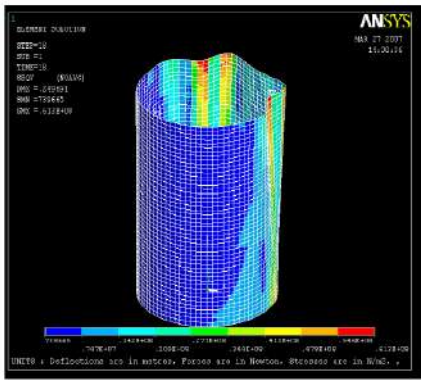
Non Destructive Testing

- Ultrasonic Pulse Velocity Test
- Rebound Hammer Test
- Half Cell Potential & Carbonation Test
- Concrete Core Test
- Concrete Chemical Tests
- Reinforcement Mapping
- Pile Integrity Test
- Pile Dynamic Test
- Weld Tests (Magnetic particle / Dye Penetrant)
- Specialized Tests for Heritage Structures
- Slab Load Test
- Structure Vibration Measurement
- Ultrasonic Thickness Measurement for Steel Members
- Inspection using Drones
- Pile Load Tests: Compression / Lateral / Uplift

Project Snapshots

Jai Neptune, Mumbai

Structural Audit at Rio Tinto Chhatarpur (M.P.)



Analysis of Concrete Silos Iceland

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Structural Assessment Services

Routine Structural Audit

- Visual Assessment
- Non-Destructive Testing
- Identify members for repairs / retrofitting
- Decide repair/retrofitting methodologies
- Prepare Bill of Quantities & Budgetary Cost Estimates

Detailed Structural Assessment

- As-Built Drawing Preparation
- Structural Drawing Preparation using Rebar Mapping
- Visual Assessment
- Non-Destructive Testing
- 3D modeling & software analysis of structure
- Check strength of each structural member (beams, columns, slabs etc)
- Design Retrofitting Solutions
- Prepare Bill of Quantities & Budgetary Cost Estimates

Project Management Services

- Preparation of Tender Documents & Inviting Bids
- Evaluation of Contractor Bids & Selection of Contractors
- Permanent Site Supervision
- Project Scheduling
- Project Quality & Cost Management
- On Site Safety Administration
- Approval of Contractor Bills

Scaffolding Training

- Product Information Including Type & Usage of Couplers
- Basic Rules to Prevent Collapse
- Explanation of Design Procedure
- Review of Indian Standards Related to Scaffolding
- Maintenance & Storage Guidelines
- Safety Measures to be taken
- Training can be provided to engineers/site-workers

Project Snapshots

Solar Power Plant

Seismic Assessment of Residential Block for Cipla in Sikkim

Structural Assessment at Hospet Steel Ltd

Scaffolding Training

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STRUCTURAL DESIGN PROJECTS

Residential/Commercial/Institutional

- Cargo Complex at Santacruz Domestic Airport, Mumbai
- 38 storied residential towers at Kanjurmarg (Lodha Grande)
- 20 storied residential cum office complex Mumbai for Lotus Group
- 15 storied residential building at Kalina, Mumbai for Lotus Group
- 20 storied residential building, Silvex Developers, Mumbai
- 30 storied residential building (Lodha Simtools), Thane
- 22 storey residential building, Diamond Group, Kolkata
- Nanotechnology Department, Mumbai University
- MTNL Telephone Exchange building, Vashi
- Design of Form Work for residential building, Talib & Shamsi
- 25 storied residential building, Kanjurmarg (Lodha Aurum), Mumbai
- Guest House buildings for HAL, Kanpur
- Royal Terrace Apartments, BubbleDeck UK, Guernsey
- Broxbourne & Ware College Buildings, BubbleDeck UK
- Carol Johnson residence, California
- Woods Residence, Smart Engineering, Arizona
- Social Security Building, St. Kitts, West Indies
- Gemini Apartment Building, BubbleDeck ME, Middle East
- Pre-engineered buildings (G+5, G+10), Canada
- Medical Center, British Virgin Islands
- Hotel Frett Marina Building, British Virgin Islands
- Design of Home for the Aged project at Andheri East Mumbai
- Elpro Housing, Residential Building, Pune (G+13)
- Elpro Global International School, Chinchawad, Pune (B+G+5)
- CDKD Hospital Building, Mumbai (G+17)
- Silver Skyline (G+18), Andheri (w)
- Lotus Jai Neptune (G+18), Malad (w)

Clients

Goldman Sachs
Cipla Caring for life
RioTinto
Chemtrols Solar
BubbleDeck UNITED KINGDOM
AFL PUTTING IT ALL TOGETHER
RITES THE INFRASTRUCTURE PEOPLE
Godawari Power & Ispat Limited
BEEKAY CORP
IIT Bombay

Industrial

- Design of Industrial Plant structures for Epsilon Carbon at Vijaynagar, Karnataka (ongoing)
- Design of Warehouse for LVVPL at Patna – Wheel Detergent Factory
- Manufacturing facility for Japanese firms, Tsujikawa & Hanwei at Bangalore
- Site Assembly Shop for Nuclear Power project at Kalpakkam
- 500/230/110 kV GIS Substations for KEC International at Chennai

Reliance Industries Limited
Godrej

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- Control Room Buildings for Electric Substations at Afghanistan
- Pre-bid Engineering for Electric Substations at Zambia
- Design of Power Equipment Manufacturing Plant, NBPPL, Chitoor
- Temporary Structures for cyclone replacement at IOCL, Vadodara
- Fabrication plant for BHEL, Varanasi
- Expansion of Existing Machine Shops for BHEL, Varanasi
- Steel fabrication facility for BK Koks, Bhilai
- Design of Gantry Shed for BK Koks, Bhilai
- Design of Boiler House, Larsen & Toubro, Hazira
- Design of Printing Press building, Times of India, Lucknow
- Design of mezzanine floor for Godrej Industries Ltd.
- Design of factory shed for Silvol plant at Silvassa
- Detailed Engineering for 1.2MTPA Pellet plant for Godawri Power & Ispat Ltd.
- Showroom & Workshops for Tata Motors Dealership at Muzaffarpur
- Design of Telecom towers (4G deployment) for Reliance Industries
- Design of Guyed Wind Masts and Latticed Towers, Shah Energy Inc
- Design of Form work system for Mumbai Metro, Ghatkopar Station
- Design of Solar Mounts & Control station for Chemtrols Solar
- Design of Road Sign Structures for 3M India Ltd.
- Design of Wind Turbine Towers for ABS Group, Mumbai
- Design Review of Glenmark Pharamaceuticals, Sikkim
- Design of Solar Power Plant Structures for Solaire Direct India Ltd.
- Electrical Substation Building, Palm Jebel Ali, Dubai
- Fair & Show Electrical Substation, Dubai
- Design of Electric Substations at Ghana, Africa
- Analysis of Concrete Silos, Alcan Iceland Ltd., Iceland
- Design of AAC Panel Walls for Windmill Workshop, Texas
- Design of Skid structure for John Crane, Singapore

STRUCTURAL ASSESSMENT PROJECTS

- Structural Assessment of more than 1,200 Civil Structures for Tata Steel at their Plant in Jamshedpur (ongoing)
- Structural Assessment of more than 100 Civil Structures for Tata Steel at their Plant in Kalinganagar, Odisha
- Structural Assessment of Residential, School and Plant Buildings for Godrej & Boyce Ltd, Mumbai (ongoing)
- Structural Assessment & Retrofitting Design of Huntsman India Office cum Lab building in Mumbai
- Structural Assessment of Hindustan Unilever Abhiyaan R&D Building at Mumbai
- Structural Assessment & Retrofitting Design of Industrial Shed for Trident Plant at Barnala, Punjab
- Structural Assessment & Retrofitting Design of Tata Tin Plate Machine Shop at Jamshedpur
- Structural Assessment & Retrofitting Design of IndusInd Media office in Andheri, Mumbai
- Structural Assessment & Retrofitting Design of Rock Phosphate Raw Material Shed for IFFCO at Paradeep
- Seismic Assessment & Retrofitting Design of Residential Buildings for Cipla Ltd. at Sikkim
- Structural Assessment & & Retrofitting Design for John Deere Tractor Assembly & Paint Shops at Pune
- Structural Assessment & Retrofitting Design of Mini Blast Furnace and LRF Buildings at Hospet Steel Ltd, Hospet
- Design of Retrofitting for LPG plant, ONGC, Uran
- Seismic Assessment & Retrofitting Design of office building, AFL Logistics, Mumbai
- Structural Assessment of R&D lab building for Godrej Sara Lee Ltd.
- Structural Assessment of Rolls Royce facility at Turbhe for blast vibrations
- Structural Assessment of DMS Plant for Rio Tinto at Chhatarpur (M.P.)
- Seismic Assessment of Office Building, Goldman Sachs, Mumbai
- Structural Assessment & Retrofitting Design of Halliburton facility at Barmer (Raj.)
- Structural Assessment of Cooling Towers at Haldia Energy Ltd., Haldia
- Structural Assessment for fire affected SHCIL House at Mahape, Mumbai
- Structural Assessment of Community Structure for Jagadguru Narendracharya Maharaj Sansthan, Ratnagiri
- Non-Destructive Testing for Bombay Scottish School, Mahim
- Structural Assessment of Tata Trust School at Navsari
- Structural Assessment & Retrofitting Design of Elpro Business Bay in Pune
- Structural Assessment & Retrofitting Design of Elpro Corporate Building in Pune
- Structural Assessment & Retrofitting Design of Municipal Corporation of Mumbai's R-South Office Building at Kandivali, Mumbai
- Structural Assessment & Retrofitting Design of Mata Amritanandmayi Building in Nerul,

Navi Mumbai

- Structural Assessment & Retrofitting Design of Kinara residential building at Bandra
- Structural Assessment & Retrofitting Design of Bliss Pharma Building, Hubli
- Structural Assessment & Retrofitting Design of Indian Coastal Guard Office Building at Worli
- Earthquake Time History Simulation of 3-D Structure, Core Projects

Clients

Hindustan Unilever Limited

HINDUJA

Hiranandani
creating better communities

LARSEN & TOUBRO
It's all about Imagineering

HUNTSMAN
Enriching lives through innovation

Rolls-Royce

HALLIBURTON

TATA CONSULTING ENGINEERS LIMITED

glenmark
A new way for a new world

एन बी सी सी
NBCC

MAHANAGAR GAS

ABP न्यूज़

इंडियन बैंक
Indian Bank

The Indian EXPRESS

Bombay Scottish School, Mumbai

StockHolding™
We look after everything

Shapoorji Pallonji

PURANIK'S
Ideas that stay with you

ATG
ALLIANCE TIRE GROUP

YOKOHAMA

बृहन्मुंबई
महानगरपालिका
Municipal Corporation
of Greater Mumbai

EFKON

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Case Study: Tractor Manufacturing Plant, Pune

Project Requirement

- Prepare structural drawings for existing plant buildings (13 yrs old) as original drawings were misplaced
- Carry out detailed structural assessment of the buildings
- Determine if surplus capacity exists for an additional production line

Geometric Data Collection

Assessment Procedure

Stage I: Data Collection/Drawing Preparation

- On-site measurements were carried out for all structural elements of the building (beams, columns, roof trusses, selective foundations)
- Measurements were also carried out for production line conveyors, paint booths and other equipment supporting structures
- Loading data was obtained for assembly lines, equipment supporting structures
- As-built structural drawings were prepared based on the obtained data

Stage II: Testing & Condition Assessment

In addition to Visual Assessment, following tests were carried out to ascertain the condition of the structure

Test	Purpose
Concrete Core Tests	To determine the compressive strength of concrete
Ultrasonic Pulse Velocity	To establish the quality of concrete
Half-Cell Potential & Carbonation	To assess the probability of corrosion in reinforcement
Reinforcement Mapping Tests	To obtain size and numbers of reinforcing bars in the concrete members
Weld Tests (Magnetic Particle + Liquid Penetrant)	To check the condition of welds in structural steel members
Ultrasonic Thickness Measurement	To estimate loss in thickness of steel members due to corrosion

Stage III: Interpretation of Results & Structural Analysis

- Based on the test results, inferences were made for use in structural analysis. These included the concrete grade, reinforcement quantity in members, corrosion in reinforcement and effective sections for steel members.
- Software analysis was carried out based on the prepared drawings & test results.
- Conclusions & recommendations were provided in reference to:
    - Stability of the structures with current loads
    - Possibility of adding a production line
    - Suggestions to improve the structural performance including retrofitting where required

Assembly Shop

Footing Measurement

Member Testing

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Case Study: Structural Assessment for Blast Vibrations

Project Requirement

- Vibrations occurring in office & workshop buildings due to regular blasts occurring in stone quarries nearby
- Structural Stability in terms of strength & serviceability including occupant's comfort level was to be determined

Assessment Procedure

Stage I: Data Collection

- Acceleration measurement equipment was set up on each structure
- Accelerometers were fixed at different locations on the building to measure the acceleration whenever any vibration due to blast occurs
- Data was collected over two days and the peak acceleration was obtained after processing the obtained data

Stage II: Structural Analysis

- Computer analysis was carried out for the structures using the vibration forces in combination with gravity, wind and seismic forces.
- Design of the structures was checked and conclusion regarding the safety and comfort levels for the buildings was drawn.

Accelerometer fixed to terrace slab

Data collection system