

INDIAN METAL BUILDING FORUM (IMBF)

METAL BUILDINGS

Why they matter, how they are built, the technology behind them & the future of engineering

- From Soil to Steel
- From Design to Digital Manufacturing
- From Fabrication to Erection
- From Knowledge to Career



Building India's Steel Future

For Civil & Mechanical Engineering students, faculty, researchers and future technologists

Why are buildings changing?



Traditional site construction

VS



Industrialized metal building construction

Can a building increasingly be...

DESIGNED

like a product

MANUFACTURED

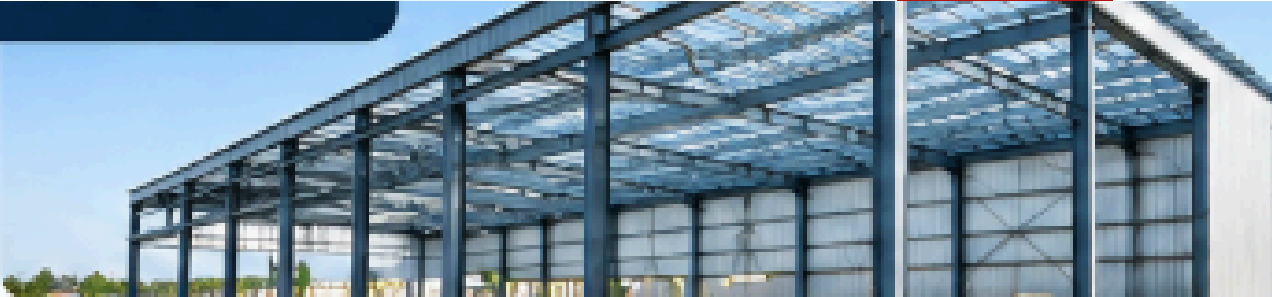
like a machine

TRANSPORTED

like a product

ASSEMBLED

like a system

	Same Foundation. Different Possibilities. Choose what fits your project.	
RCC (Reinforced Cement Concrete) Conventional. Proven. Widely Used.		Metal Building (Pre-Engineered Building) Modern. Optimized. Future-Ready.
Required (same for both)	 Soil Testing	Required (same for both)
Structural design for RCC (beams, columns, slabs)	 Design	Optimized, tapered members; lighter design
Skilled and unskilled labour (more)	 Manpower	Skilled labour (less)
Higher (mixing, pumping, curing, etc.)	 Power Consumption	Lower (mainly for fabrication and erection)
On-site construction (multiple stages)	 Time Schedule	Faster (fabrication in parallel, quick erection)
Cement, sand, aggregate, steel rebar	 Materials	Rolled, built-up & cold-formed steel
Mostly on-site (formwork, casting, curing)	 Manufacturing	Mostly in factory (controlled environment)
Formwork → pour → cure (sequential)	 Construction Method	Bolt-up assembly (dry construction)
Depends on site conditions	 Quality Control	Factory QA/QC, traceable
Heavy, wet, longer on site	 Site Work	Lighter, dry, focused
Slower (sequential activities)	 Speed	Faster (parallel fabrication and site work)
Difficult; often demolition	 Expansion / Modification	Easier (can be planned into the design)
Heavier → larger foundations	 Weight	Lighter → often smaller foundations
Mostly demolished	 Reuse / Recyclability	Recyclable; members can be reused
Cracks, rebar corrosion (needs maintenance)	 Maintenance	Coatings & corrosion protection (lower maintenance)

From imagination
to iconic skylines...
STEEL makes
it possible.

WORLD'S ICONIC SUPER TALL BUILDINGS

ENGINEERED WITH STEEL – SHAPING A STRONGER TOMORROW

*"Steel builds
a better, taller
and brighter world"*

1 BURJ KHALIFA Dubai, UAE

828 m
(2,717 ft)
163 Floors



Structural System :
Reinforced concrete core +
structural steel (spire & upper levels)

Steel Usage : > 4,000 tonnes
(in spire alone)
Completed : 2010

2 MERDEKA 118 Kuala Lumpur, Malaysia

678.9 m
(2,227 ft)
118 Floors



Structural System :
Composite (concrete + steel)

Steel Usage : ~ 65,000 tonnes
Completed : 2023

3 SHANGHAI TOWER Shanghai, China

632 m
(2,073 ft)
128 Floors



Structural System :
Composite with major
structural steel elements

Steel Usage : ~ 85,000 tonnes
Completed : 2015

4 PING AN FINANCE CENTER Shenzhen, China

599 m
(1,965 ft)
115 Floors



Structural System :
Composite (concrete core +
steel mega-frame)

Steel Usage : ~ 80,000 tonnes
Completed : 2017

5 CITIC TOWER (China Zun) Beijing, China

528 m
(1,732 ft)
108 Floors



Structural System :
Composite with large
steel structure

Steel Usage : ~ 57,000 tonnes
Completed : 2018

6 SHANGHAI WORLD FINANCIAL CENTER Shanghai, China

492 m
(1,614 ft)
101 Floors



Structural System :
Steel-concrete composite

Steel Usage : ~ 55,000 tonnes
Completed : 2008

STEEL IN MODERN CONSTRUCTION



High
Strength



Lighter
Structures



Faster
Construction



Sustainable
& Recyclable



Cost
Efficient



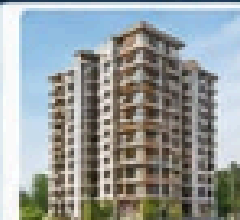
Durable &
Resilient

FROM STEEL FRAMES TO GLOBAL LANDMARKS

Steel enables higher, faster,
stronger and more sustainable
buildings – from skyscrapers
to industrial, commercial
and residential structures.



APPLICATIONS OF STEEL BUILDINGS



Residential
(Apartments)



Commercial
(Offices, Malls)



Industrial
(Factories, Warehouses)



Infrastructure
(Airports, Stadiums, Bridges)

What is a metal building?

A broad family of building systems whose primary structure is steel — designed, manufactured and assembled as an engineered system.

Key clarification

PEB (Pre-Engineered Building) is one important category within the wider metal-building ecosystem — not the whole of it.



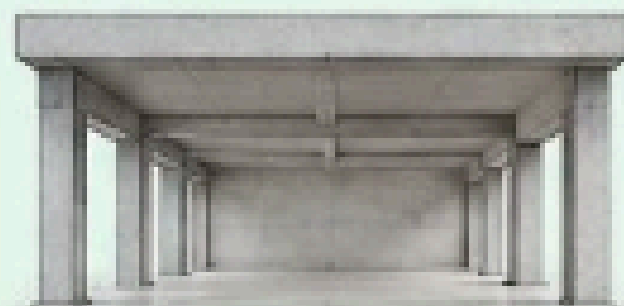
What is Clear Span?

Clear span is the unobstructed distance between two supports (columns or walls) inside a building. It is the usable open space without any intermediate columns.



Typical Clear Spans

RCC Building



Pre-Engineered Steel Building (PEB)

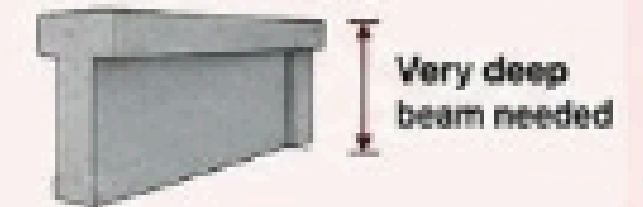


Why RCC Struggles Beyond 12 m?

Reinforced Cement Concrete (RCC) works well for smaller spans, but beyond about 12 meters, it becomes challenging because:

1 Large Beam Depth Required

To span longer distances, RCC beams need to be very deep (tall). This reduces headroom and is not practical for many buildings.



2 High Self-Weight

RCC is heavy. As the span increases, the beam's own weight increases a lot, which requires even larger beams and columns.



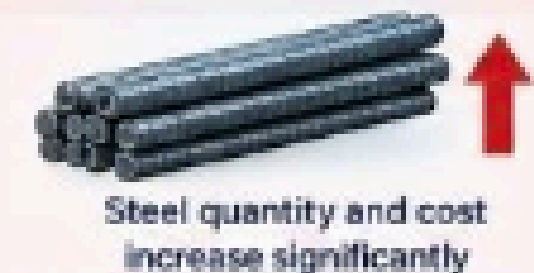
3 Cracking and Deflection

Longer RCC beams are more prone to cracking and excessive deflection, affecting serviceability and appearance.



4 More Steel and Cost

Longer spans need much more reinforcement steel, increasing cost and making construction complex.



5 Construction Difficulty

Shuttering (formwork), support, and curing for





INDIAN METAL BUILDING
FORUM

CONNECT • COLLABORATE • CREATE • CONSTRUCT • CERTIFY

PRE-ENGINEERED STEEL BUILDINGS

SMARTER SOLUTIONS
FOR A STRONGER TOMORROW

FASTER | STRONGER | GREENER | MORE FLEXIBLE



01 Industrialized production



Precision manufacturing in a controlled environment ensures better quality and faster delivery.

02 Factory-controlled quality



Consistent quality with stringent inspections at every stage.

03 Rapid assembly potential



Pre-fabricated components enable quick and efficient erection.

04 Long clear spans



Column-free large spaces for maximum usable area.

05 Layout flexibility



Easily adaptable to different sizes, functions.

06 Expansion & modification



Simple to expand, relocate or modify.

07 Reduced site operations



Less on-site work, reduced waste, faster.

08 Recycling & reuse potential



Steel is recyclable, making it an

09 Digital-manufacturing ready



Compatible with BIM and digital tools.

Five major metal-building domains



1. Residential



2. Commercial



3. Industrial



4. Infrastructure



5. Modular / Special

Residential: homes, hostels and housing at speed

- 01 Light-gauge steel homes & villas
- 02 Multi-storey steel-framed housing
- 03 Student accommodation
- 04 Worker accommodation & site camps
- 05 Modular & affordable housing



Dry construction, dimensional precision and repeatable units make steel attractive where speed and quality consistency matter.



Commercial: open spaces people use every day

- 01 Showrooms & retail
- 02 Offices & business parks
- 03 Hotels & mixed use
- 04 Sports facilities & arenas
- 05 Schools & auditoriums



Column-free space, facade freedom and future re-planning are often worth more to owners than the frame itself.



Industrial: the heartland of PEB

- 01 Factories & process plants
- 02 Warehouses & logistics facilities
- 03 Cold storage
- 04 Data centers
- 05 Crane buildings (EOT)



Long clear spans, crane loads and planned expansion are exactly what engineered steel frames are optimized for.



Infrastructure: public-scale steel

- 01 Airports & terminals
- 02 Railway & metro stations
- 03 Foot-over bridges & walkways
- 04 Bus terminals & depots
- 05 Power & utility buildings



Large roofs, fast construction over live operations and complex geometry push steel and digital fabrication to the front.



Modular & special structures



- 01 Aircraft hangars
- 02 Stadium & long-span roofs
- 03 Modular cabins & volumetric units
- 04 Mezzanines & canopies
- 05 Pipe racks & equipment structures



When a structure must be huge, relocatable or delivered complete, it becomes a manufacturing problem as much as a design one.

Why an ecosystem is needed



One company knows fabrication. Another knows design. Another knows automation or coatings or modular. Universities know research.

Students
need jobs &
exposure



Industry
needs skilled
people

**Knowledge is fragmented.
There must be a platform
that connects it.**

Why the Indian Metal Building Forum?

An emerging, independent, vendor-neutral ecosystem platform for India's metal-building industry.



An emerging, independent, **vendor-neutral** ecosystem platform for India's metal-building industry.

CORE PURPOSE



CONNECT

People. Ideas. Opportunities.



COLLABORATE

Across the value chain.



CREATE

Knowledge. Innovation. Growth.



CONSTRUCT

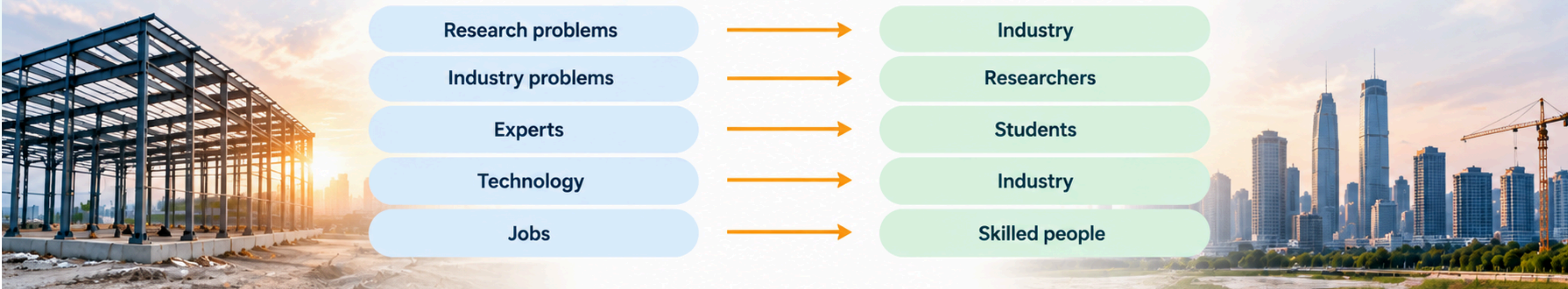
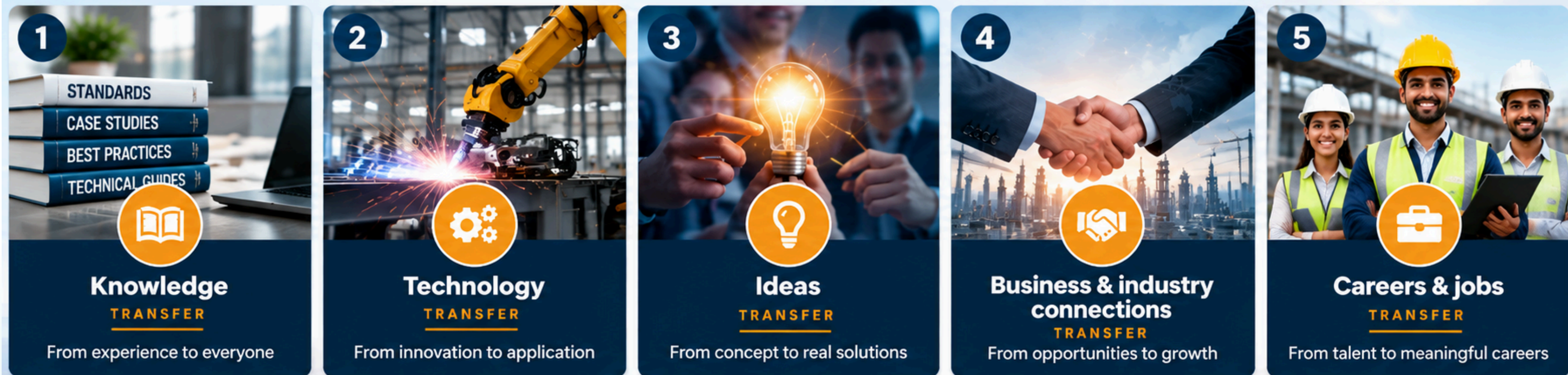
A stronger, sustainable tomorrow.



**INDIAN METAL
BUILDING FORUM**

BUILDING A STRONGER INDIA

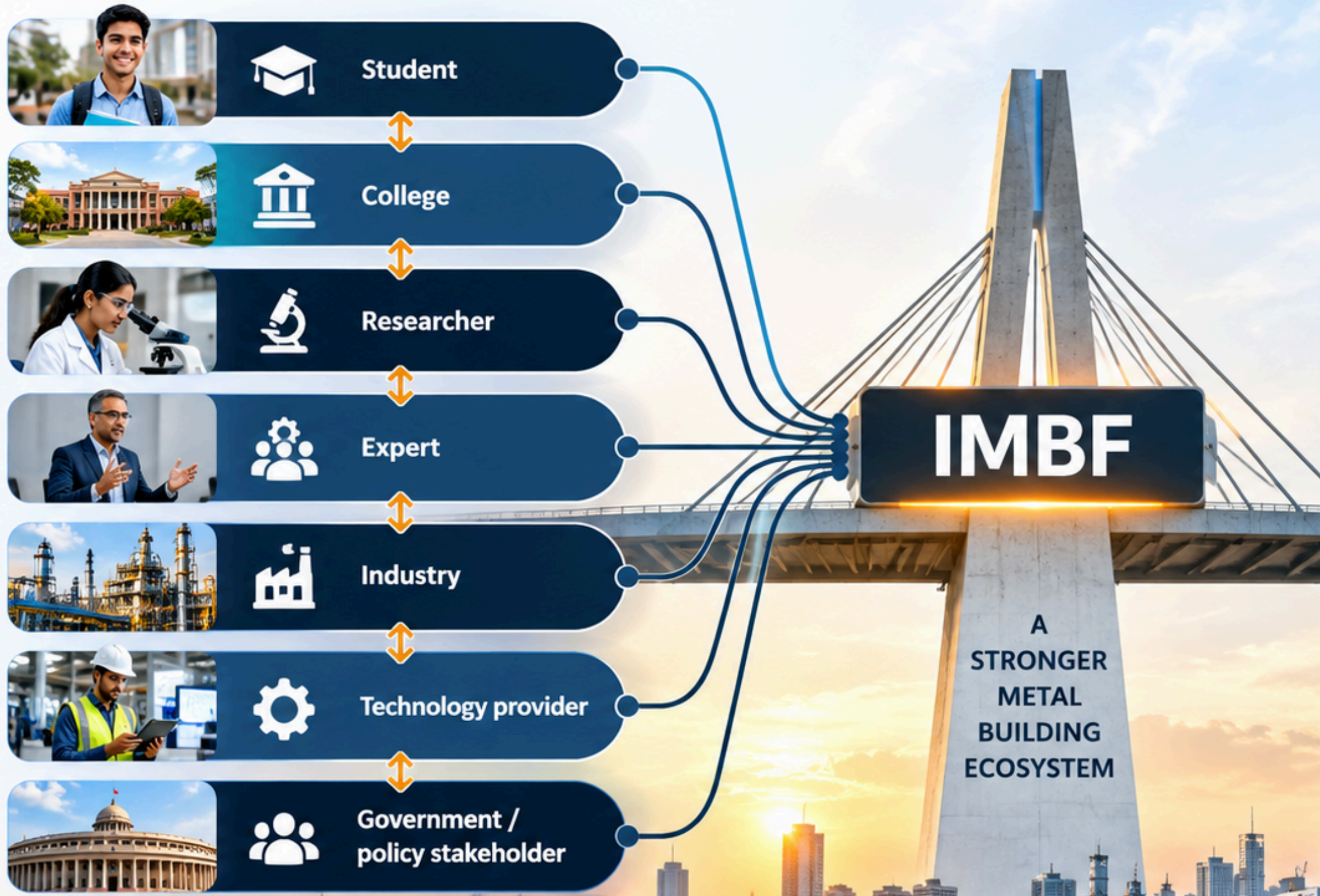
What IMBF can enable: **five kinds** of transfer



IMBF as a bridge

Connecting People. Knowledge. Industry. A Stronger Tomorrow.

PEOPLE | COLLABORATION | INNOVATION | GROWTH



IMBF IS

A facilitator of communication and collaboration — a neutral meeting point where these groups can find each other and work together.



IMBF IS NOT

A replacement for professional bodies, regulators or statutory authorities. It works alongside them.

BUILDING
CONNECTIONS
FOR A BRIGHTER
TOMORROW

One industry voice

When many stakeholders independently face the same technical or regulatory problem, a representative forum can help:

COLLABORATE | REPRESENT | ENABLE | GROW

A STRONGER INDUSTRY TOGETHER



Many voices



“Many voices can become *one informed technical dialogue.*”

IMBF holds no government or statutory authority. Its role is to gather evidence and support constructive dialogue with the bodies that do.

From soil to steel: 24 stages of a metal building

Stronger
Faster
A Better Tomorrow

01 Site survey



02 Soil investigation



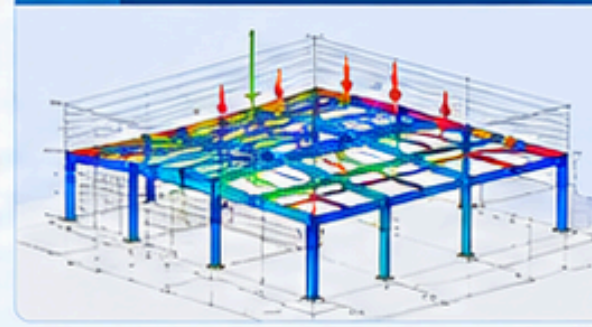
03 Foundation



04 Anchor bolts



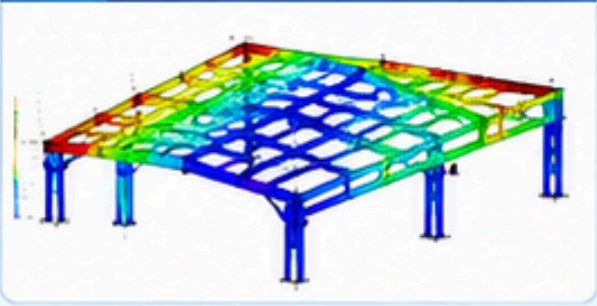
05 Structural loading



06 Conceptual design



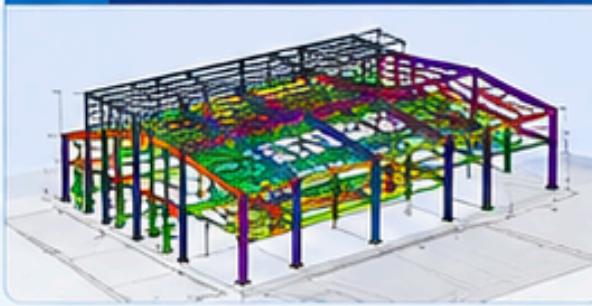
07 Structural analysis



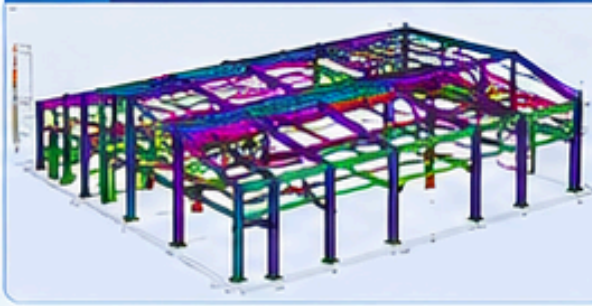
08 Connection design



09 BIM



10 Tekla / detailing



11 Procurement



12 CNC cutting



13 Drilling



14 Fit-up



15 Welding



16 QA/QC



17 NDT



18 Surface prep



19 Painting



20 Logistics



21 Crane planning



22 Erection



23 Roofing / cladding



24 Final inspection



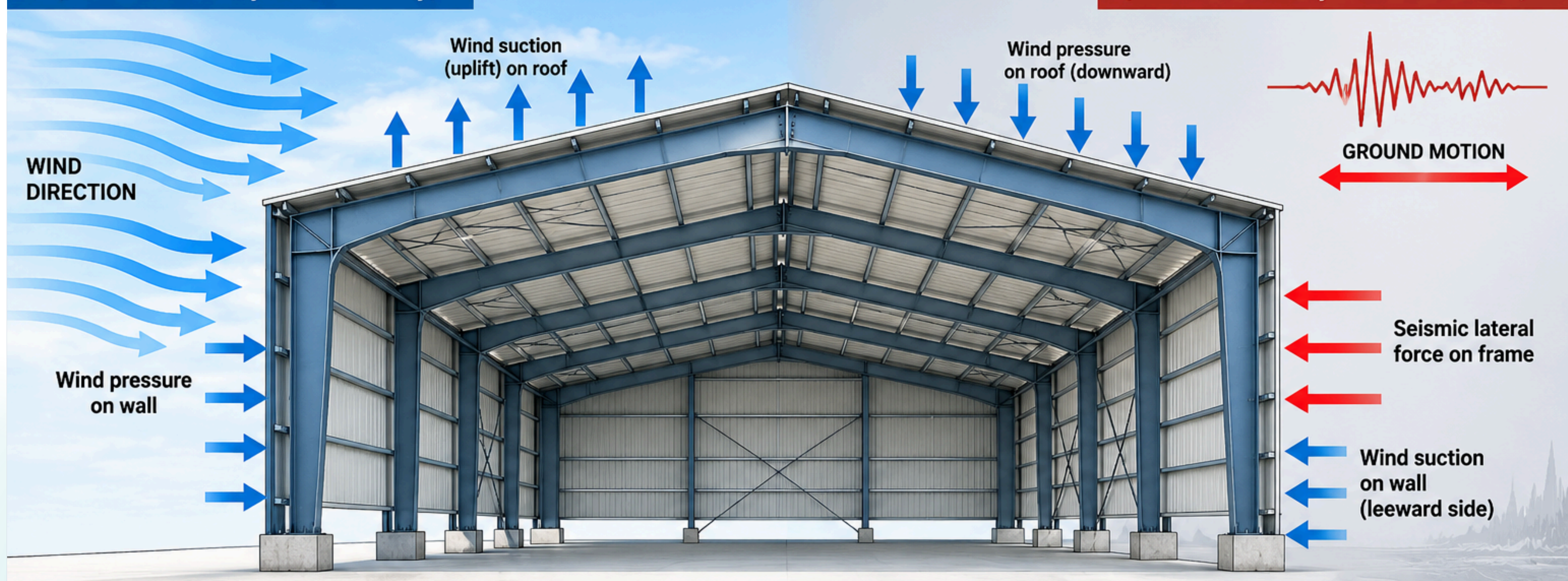
Planning | Engineering | Fabrication
IMBF | Metal Buildings: From Soil to Steel

Erection | A Stronger Tomorrow

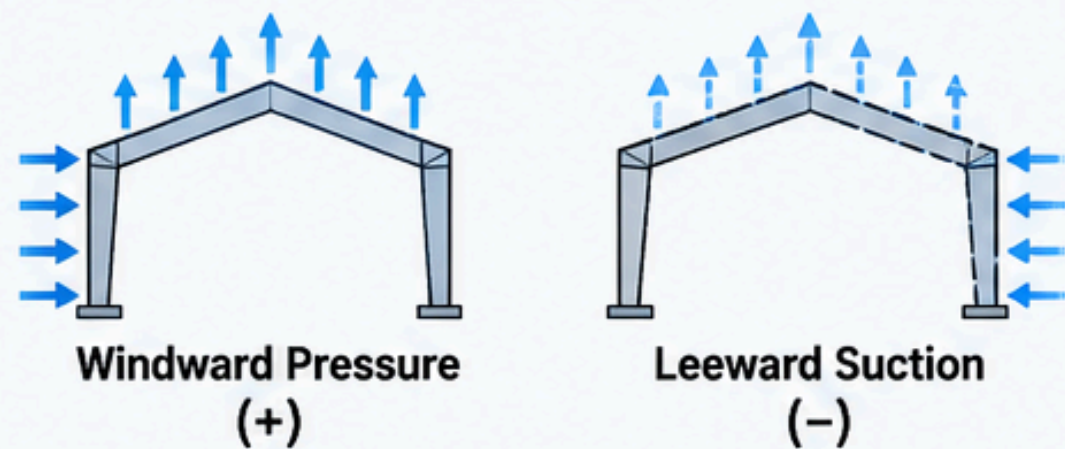
Buildings for a Better Tomorrow

(Acts horizontally and vertically)

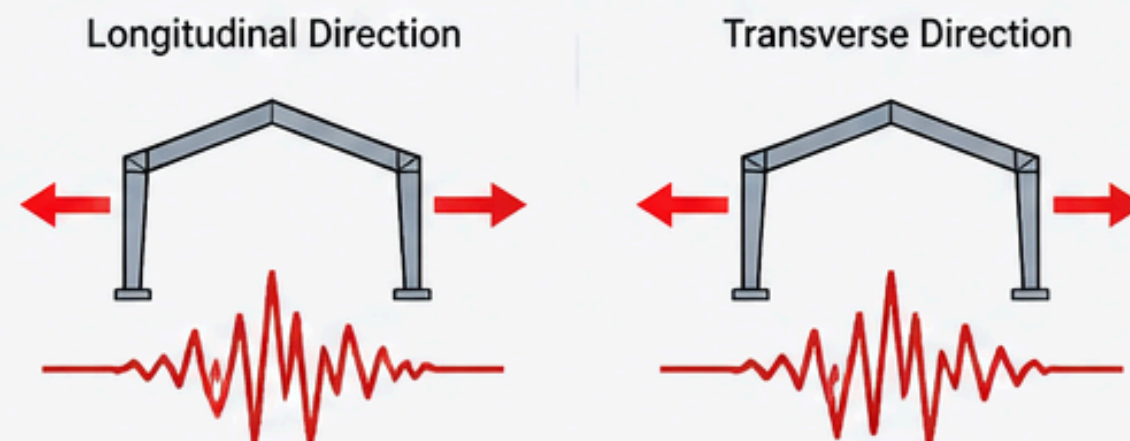
(Acts horizontally in all directions)



Wind Load Cases



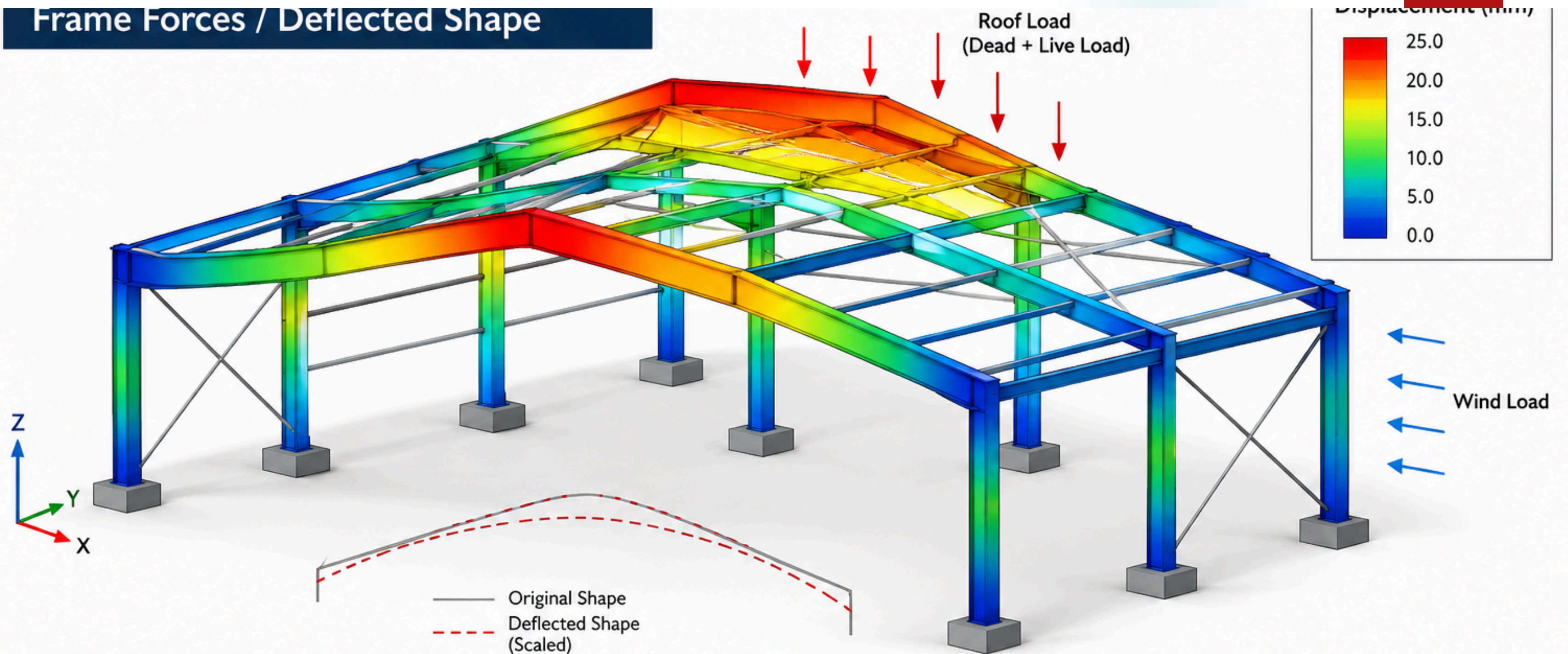
Seismic Load Cases



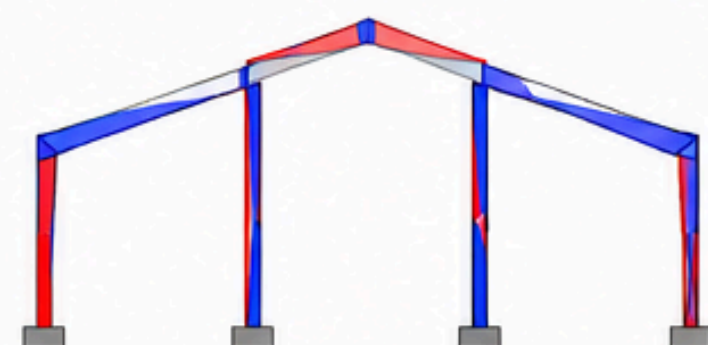
Key Points

- Wind loads act on walls and roof as pressure or suction (uplift).
- Seismic loads act horizontally in both directions (longitudinal and transverse).
- Design as per relevant codes (e.g., IS 875, IS 1893).
- Ensure proper bracing, connections and foundation design.
- Check combined load cases for safe design.

Frame Forces / Deflected Shape

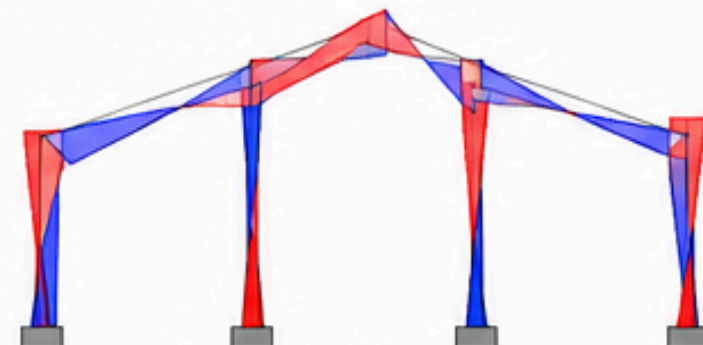


Axial Force (kN)



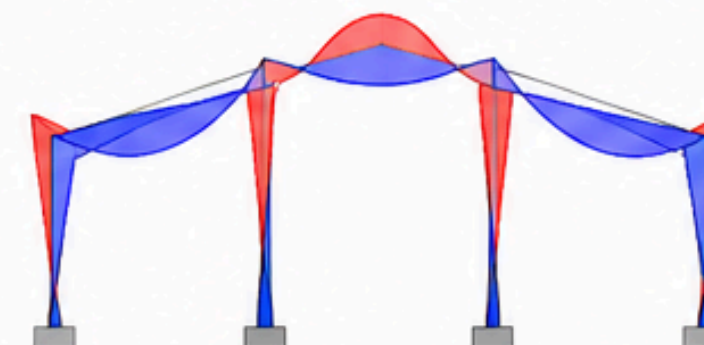
Red: Tension (+)
Blue: Compression (-)

Shear Force (kN)

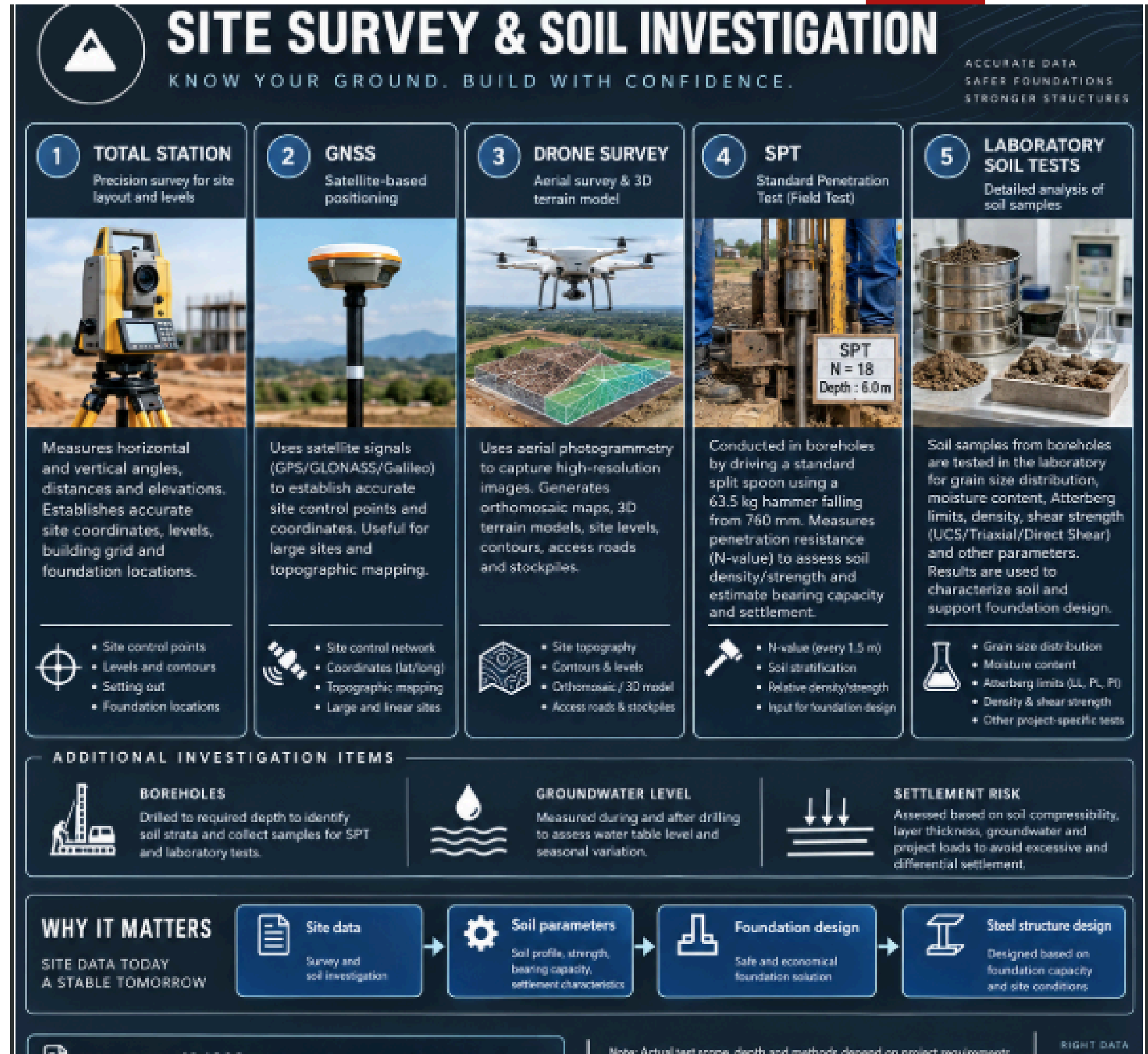


Red: Positive (+)
Blue: Negative (-)

Bending Moment (kN·m)



Red: Positive (+)
Blue: Negative (-)





FOUNDATIONS & ANCHOR BOLTS

Strong Foundation for a Stronger Structure

Right Design
Longer Life

1. TYPES OF FOUNDATIONS

Foundations transfer building loads safely to the soil.



Isolated Foundation

- Single column
- Used for low to medium loads
- Most common for metal buildings



Combined Foundation

- Two or more columns on one footing
- Used when columns are close
- Saves space and cost

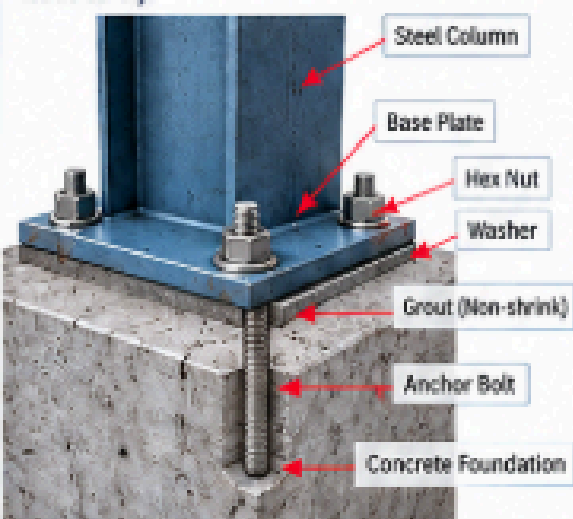


Pile Foundation

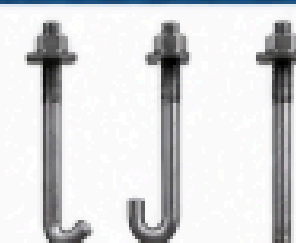
- Used for weak soils
- Transfers load to deeper strong soil/rock
- Suitable for heavy or high-rise structures

2. ANCHOR BOLTS

Anchor bolts connect the steel column to the concrete foundation and transfer loads safely.



TYPES OF ANCHOR BOLTS



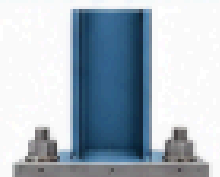
L-Type J-Type Straight Type

- Made of high strength steel
- Designed as per IS 2911 / IS 800
- Correct embedment and projection length is important

3. PINNED vs FIXED BASES

The base condition changes the behaviour of the steel structure.

Pinned Base



- Allows rotation (no moment transfer)
- Transfers only axial load and shear
- Simpler and economical
- Common for single-storey metal buildings

Fixed Base



- Resists moment (no rotation)
- Transfers axial load, shear and moment
- Used for high wind/seismic areas
- Provides greater stability

4. LEVELS & GROUTING

Proper leveling and grouting ensure full load transfer between steel and concrete.



- Set base plate at correct elevation using leveling nuts.
- Use non-shrink grout (IS 456 / approved product).
- Ensure full contact between base plate and concrete.

5. KEY STANDARDS

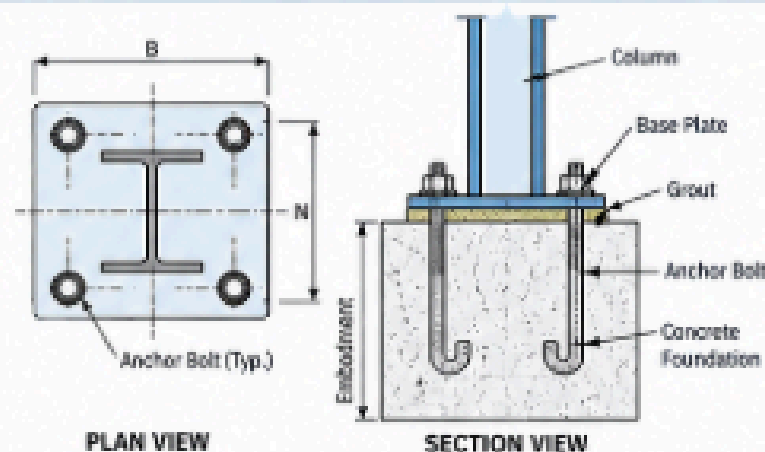
Design and installation as per Indian Standards.

IS 456	Plain and Reinforced Concrete – Code of Practice
IS 2911	Code of Practice for Design and Installation of Anchor Bolts
IS 800	General Construction in Steel – Code of Practice
IS 875	Loads on Buildings and Structures (Wind, Seismic, etc.)

6. IMPORTANT CONSIDERATIONS

- Correct foundation size based on column reactions
- Adequate soil bearing capacity
- Proper level and alignment
- Use of non-shrink grout
- Correct bolt size, embedment and torque
- Protection against corrosion
- Inspection before and after installation

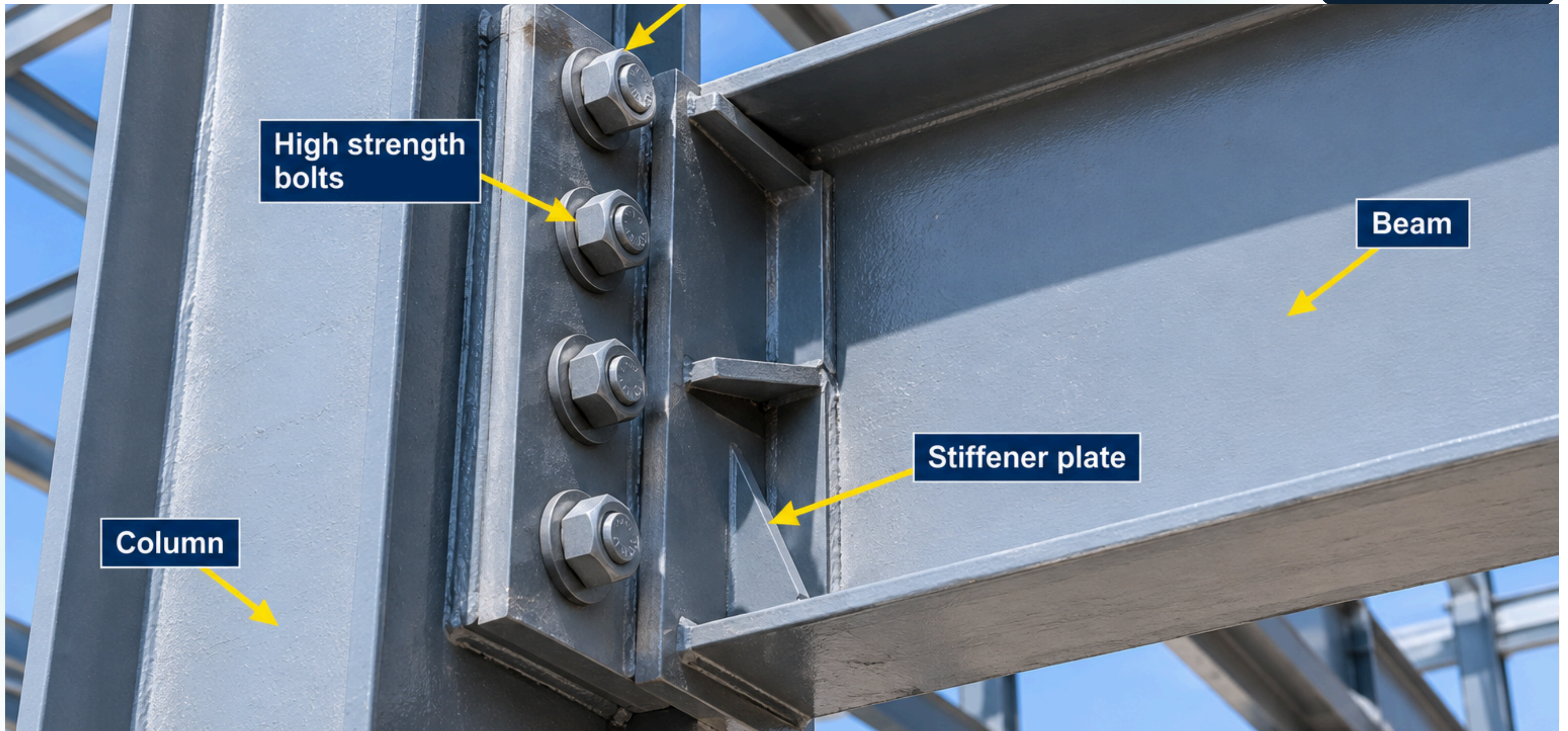
7. TYPICAL DETAILS

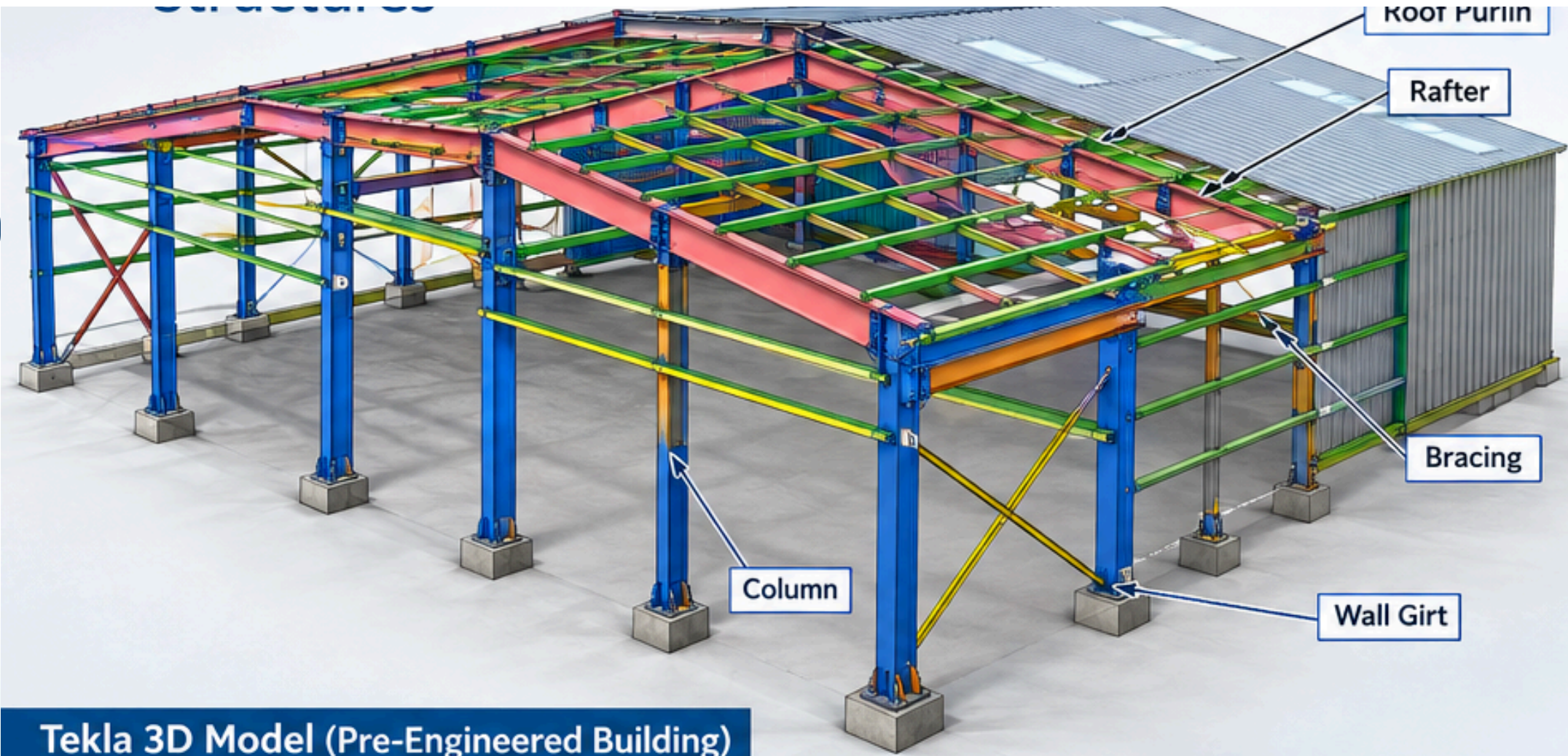


WHY IT MATTERS

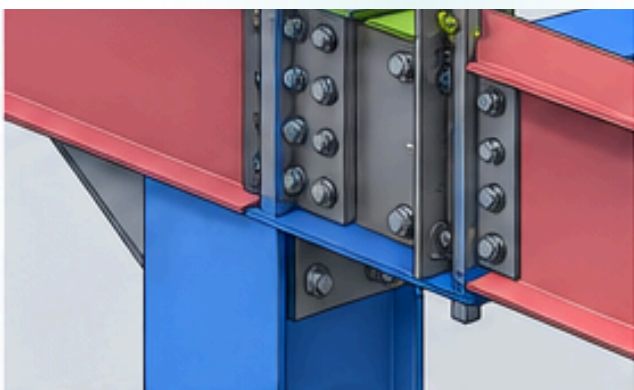
- Prevents excessive settlement and tilting
- Ensures safety and stability of steel structure
- Longer service life
- Reduces future maintenance cost



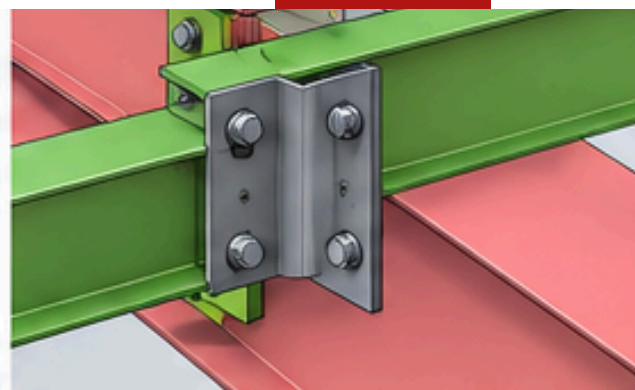




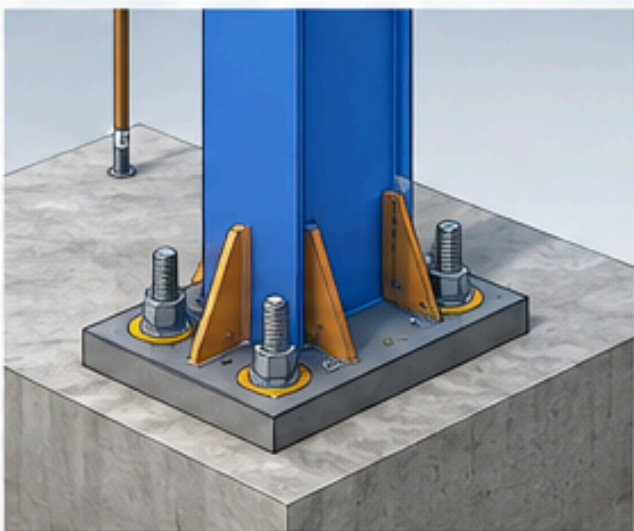
Tekla 3D Model (Pre-Engineered Building)



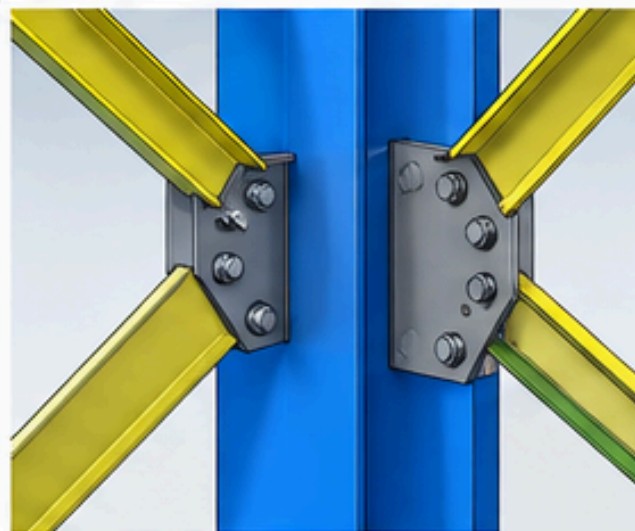
Rafter to Column Connection



Purlin to Rafter Connection

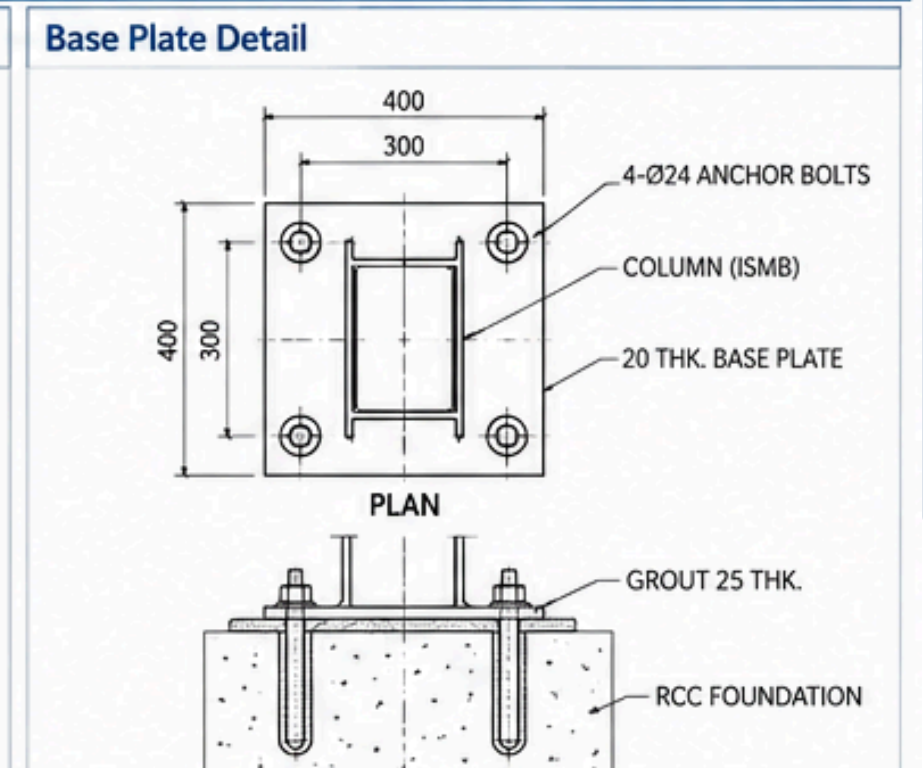
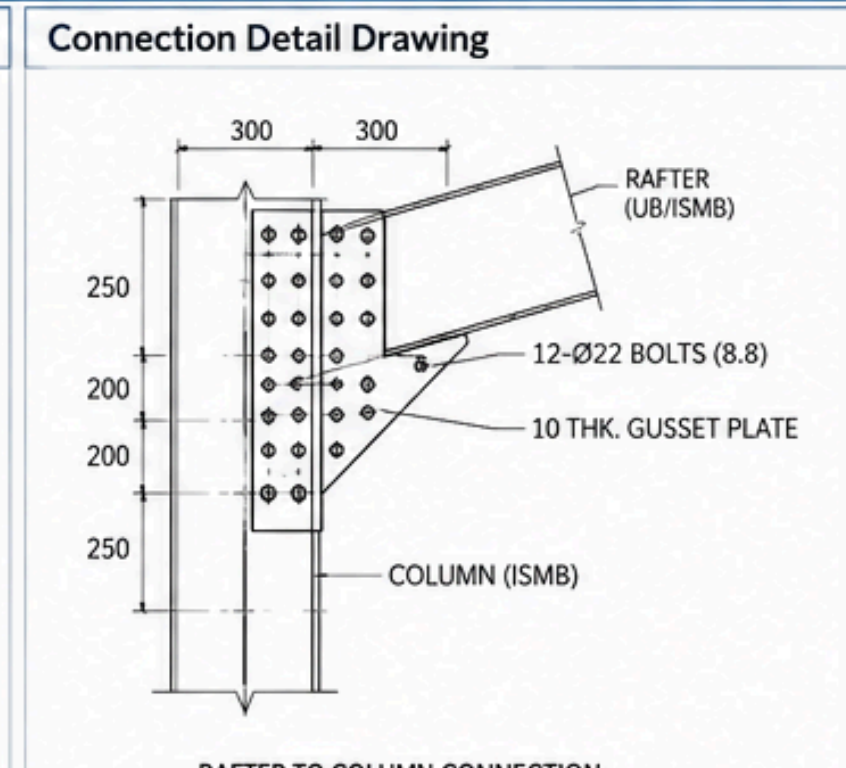
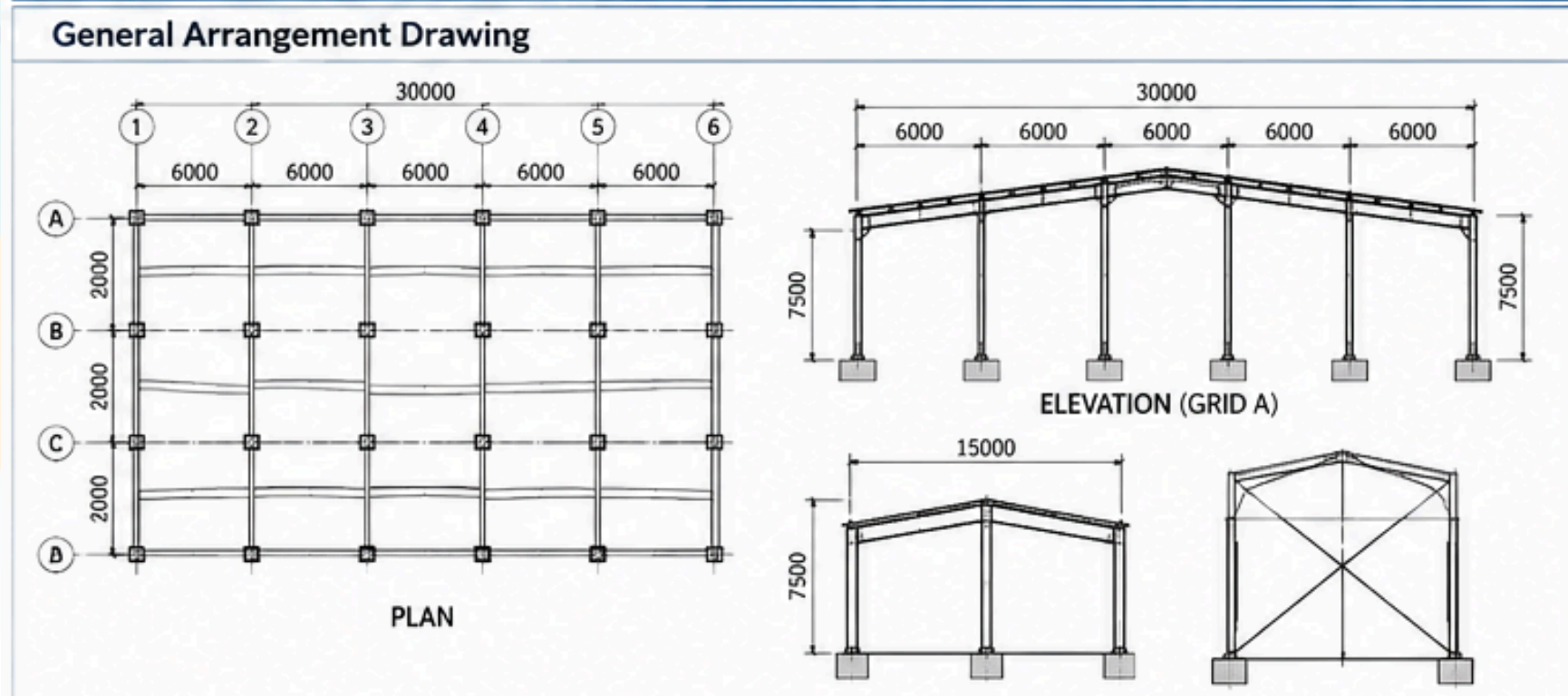


Column Base Plate Connection



Bracing Connection

Shop Drawings (Typical)









Fit-up & welding

WHAT HAPPENS

- Fit-up to tolerance before welding — alignment, gaps, squareness
- SAW for web-to-flange welds; GMAW / FCAW /SMAW for fittings
- Qualified procedures and welders (WPS, PQR, WPQ)

TOOLS, METHODS & STANDARDS

AWS D1.1

ASME Sec. IX

ISO 3834

SAW / GMAW /
FCAW/SMAW

Welding is a qualified process, not a skill guessed at the shop floor.







SHOT-BLASTING CHAMBER
CLEAN | PREPARE | PROTECT



DRY FILM THICKNESS (DFT) MEASUREMENT
RIGHT THICKNESS | BETTER PROTECTION | LONG

Surface preparation & painting

- Blast cleaning to specified grade and surface profile
- Primer, intermediate and top coats — or hot-dip galvanizing
- DFT, adhesion and holiday checks recorded



WHAT HAPPENS

TOOLS, METHODS & STANDARDS

- ISO 8501-1 (Sa 2½)
- ISO 12944
- DFT gauge
- Galvanizing

Most coating failures start with surface preparation, not paint.





Logistics & crane planning

WHAT HAPPENS

- Piece marking, bundling and dispatch in erection sequence
- Trailer loading, route survey, over-dimension consignments
- Crane selection, load charts, lift plans and ground bearing checks

TOOLS, METHODS & STANDARDS

Lift plan

Load charts

Rigging

Dispatch lists

The right piece, on the right truck, in the right order.



Project : PEB Building
Location : Trichy
Lift No. : L-01 (Rafter)
Date : 21 Sep 2026

**LIFT SAFELY
BUILD BETTER**

PLAN VIEW

SIDE VIEW

KEY INFORMATION	
Member	: R1-01 (Rafter)
Length	: 12.0 m
Weight (Est.)	: 2.8 MT
Lifting Gear	: Web slings (2 Nos.)
Crane Capacity	: 50 MT
Lift Radius	: 10.0 m
Lift Height	: 4.5 m
Remarks	: Follow lift plan and use tag lines

+ SAFETY FIRST +





Erection

WHAT HAPPENS

- Start with the braced bay; columns, rafters, then secondary members
- Bolt tightening, plumbing and alignment within tolerance
- Temporary bracing, work at height, permits and exclusion zones

TOOLS, METHODS & STANDARDS

Erection drawings

Torque wrench

Total station

Permit to work

A frame is most vulnerable while it is being built.





Roofing, cladding & final inspection

WHAT HAPPENS

- Purlins and girts, sheeting, insulation, flashings, gutters, skylights
- Final checks: bolt tightness, alignment, water-tightness, punch list
- As-built drawings, QA dossier and handover to the owner

TOOLS, METHODS & STANDARDS

Standing seam

Self-drilling fasteners

Punch list

As-built model

The building is not finished until the records are.

STANDING-SEAM ROOFING INSTALLATION

Strong | Weatherproof | Long Life

1. PANEL INSTALLATION

2. SEAM LOCKING

3. FINAL CHECK

COMPLETED BUILDING
Durable Roof. Brighter Future.

WEATHER RESISTANT

LONG SERVICE LIFE

LOW MAINTENANCE

ENERGY EFFICIENT

The digital engineering chain

IDEA TO REALITY — CONNECTED, ACCURATE, FASTER

SAME DATA.
A STRONGER TOMORROW.



Concept
Turn ideas into feasible solutions

Analysis
Simulate and optimize

3D model
Visualize in detail

Detailing
Create shop drawings

Fabrication data
Generate machine ready files

Member	Profile	Length (mm)	Qty
C1	H350	6230	1
C2	H350	6230	1
R1	H300	8120	2
B1	H200	5120	4
P1	Z200	6000	8

CNC
Precision manufacturing

Quality data
Track inspection records

Erection data
Plan and build with accuracy

As-built model
A digital twin for the future

ONE CONTINUOUS DATA THREAD — NO RE-TYPING, NO RE-DRAWING

Fewer errors
Data created once, reused everywhere downstream

Faster change
A design change ripples through drawings and machine files

Full traceability
Every piece linked to its material, weld and inspection record

BUILD SMARTER
BUILD BETTER

The software behind metal buildings

DESIGN | DETAIL | FABRICATE | BUILD | TOGETHER

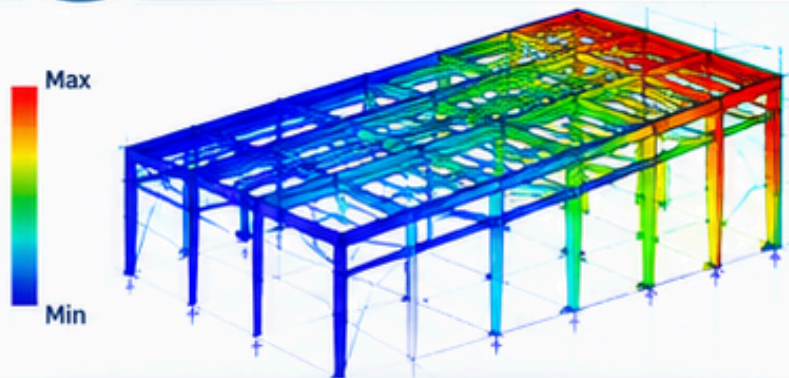
SMART TOOLS
STRONGER STRUCTURES

From Ideas
to Iconic
Structures



Analysis & design

SAFE. OPTIMIZED. EFFICIENT.

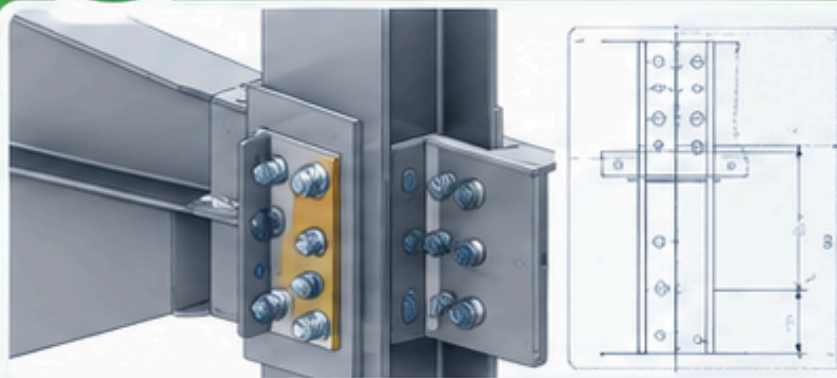


-  **STAAD.Pro**
Structural analysis and design
-  **ETABS**
Building analysis and design
-  **SAP2000**
General structural analysis
-  **PEB design suites**
Tapered member design, optimization



Connections

STRONGER JOINTS. GREATER CONFIDENCE.

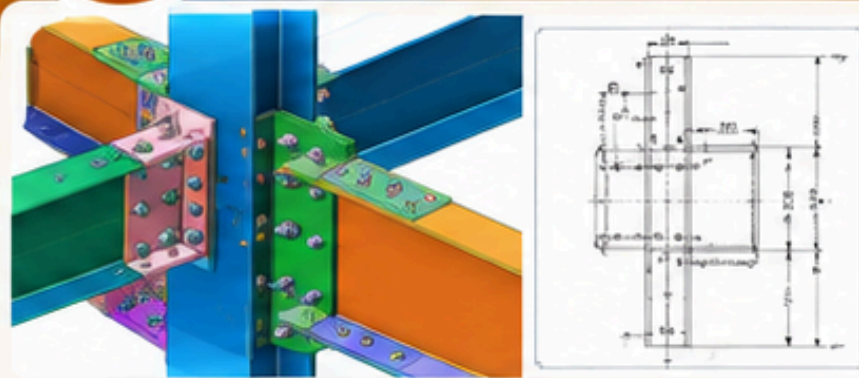


-  **IDEA StatiCa**
Connection design and check
-  **Code-check modules**
Design to international codes
-  **Spreadsheet tools**
Quick checks and calculations



Detailing & fabrication

FROM MODEL TO MANUFACTURE.



-  **Tekla Structures**
3D modeling and detailing
-  **NC / DSTV export**
Data for CNC fabrication
-  **Nesting software**
Plate and profile optimization



Drafting & BIM

COLLABORATE. COORDINATE. CONSTRUCT.

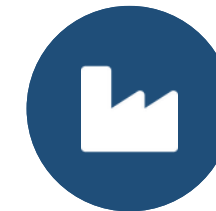


-  **AutoCAD**
2D drafting and documentation
-  **Revit**
BIM modeling and coordination
-  **BIM / CDE platforms**
Collaboration and data management
-  **IFC exchange**
OpenBIM interoperability

 BETTER DESIGN |  FASTER DELIVERY |  HIGHER QUALITY |  A SUSTAINABLE TOMORROW

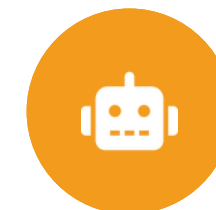
BUILD SMARTER
WITH DIGITAL

Digital manufacturing: the factory behind the building



Automatic beam welding lines

Built-up I-sections welded by SAW in continuous runs



Robotic welding cells

Repeatable welds on fittings, cleats and connections



CNC cutting & drilling

Model-driven plates, holes and markings



Roll-forming lines

Cold-formed purlins, girts and profiled sheets



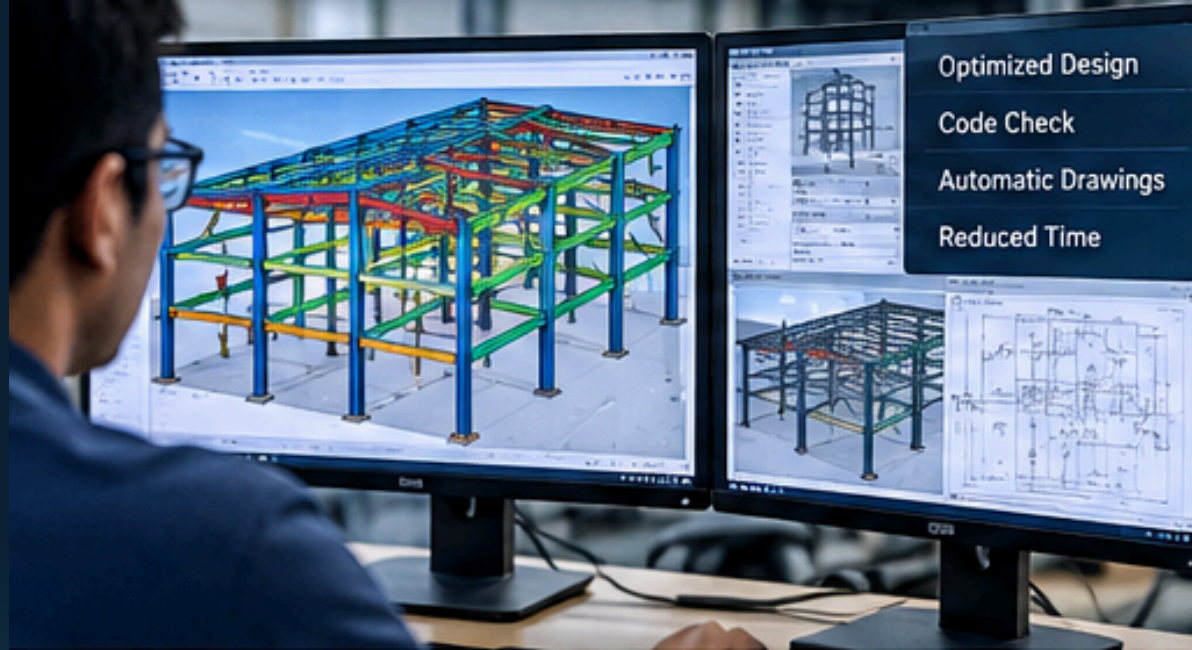
Barcode / RFID tracking

Each piece tracked from cutting to dispatch



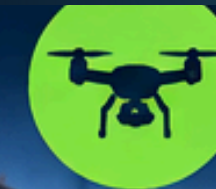
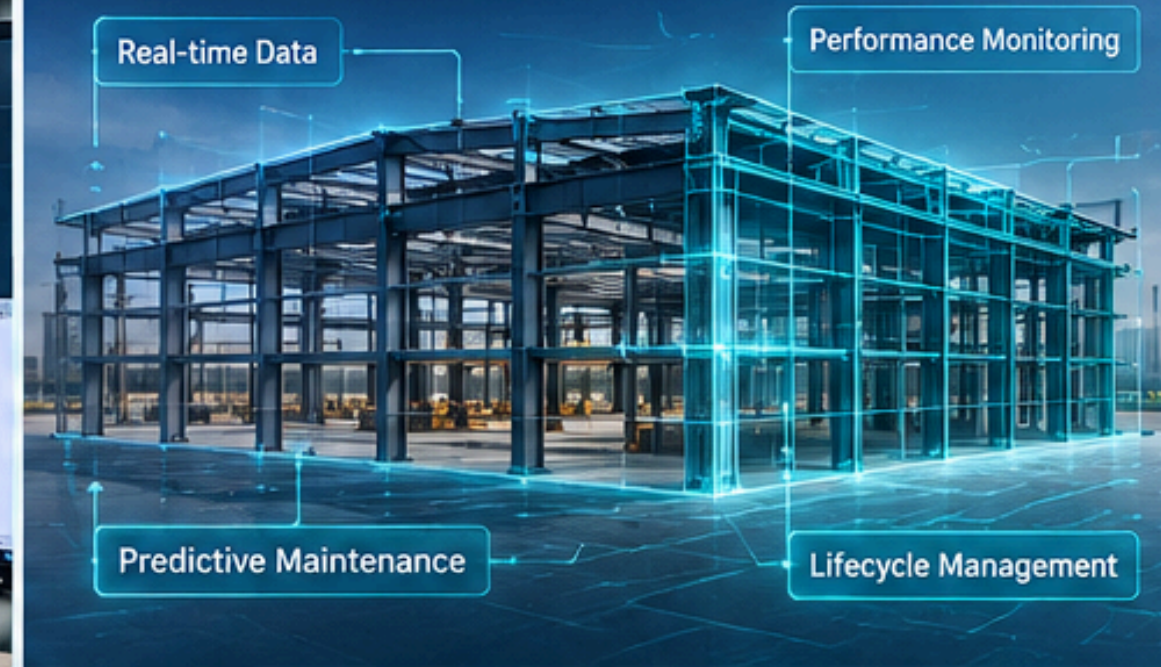
AI-assisted design

Optimizing frames, automating repetitive checks and drawings



Digital twins

A live model of the building for operation and maintenance



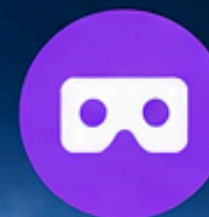
Drones & laser scanning

Surveys, progress tracking and as-built verification



IoT & structural monitoring

Sensors for strain, corrosion and performance data



AR / VR for erection

Visualizing sequence and training crews safely



Additive manufacturing

Wire-arc (WAAM) printed nodes and complex parts



Learning from China, Japan and Korea



China

Scale: factory-made steel modules and rapid-assembly high-rise demonstrations have shown how far industrialization can go.

Japan

Precision: factory-built steel-frame housing, strong seismic engineering and early construction robotics.

South Korea

Push: public and private investment in modular housing and “smart construction” technologies.

The lesson for India: industrialization is a choice — of skills, standards and systems.

Prefabrication & Assembly

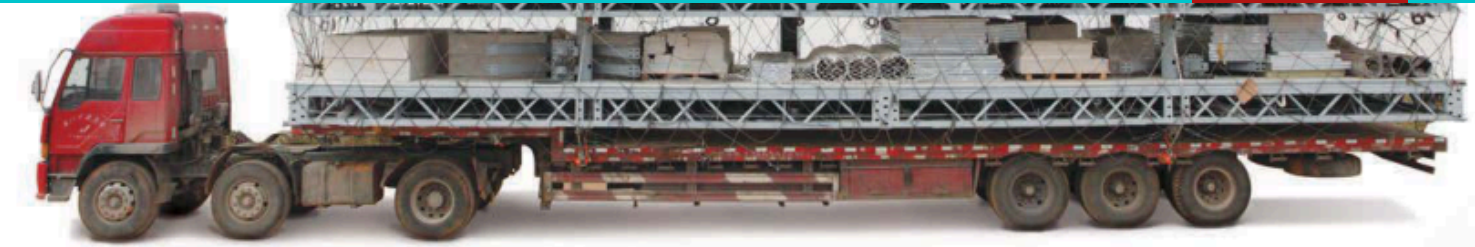
Standardized floor plates are prefabricated with pipes, wiring and flooring.

Structural steel columns are manufactured to carry the building loads.

Components are transported to site and assembled with bolts and pre-installed connections.

About 90% of the building is prefabricated in the factory, enabling rigorous quality control.

The technology can also be applied to hospitals and other building types.



During assembly, the prefabricated columns are erected and the floor plates are simply fitted into position, making the construction process “as easy as playing with Lego”. The role of the on-site workers is mainly just to connect the steel columns, bolts and wall panels, and to link up the pre-installed wiring and piping between the plates.

Prefabrication is used for other components too – exterior walls, for instance, complete with four-pane windows and integrated solar shading. Once delivered to the building site, these walls are lifted into position by cranes. In total, 90% of the building is prefabricated in the factory, which maintains efficient production and enables rigorous quality control.

While most buildings are delivered as turnkey products, clients can place orders to their own specifications. They might require only the building shell, for instance, or only the structural components for use in their projects.

BSB has invested more than USD 650 million into R&D and production capacities. Its Xiangyin factory spans 230,000 square metres, and can now produce 5 million square meters of BSB components per year.

In keeping with his vision of environmental responsibility, Zhang Yue favours the trend in which people both live and work in the same building, thereby reducing land use and commute. Accordingly, BSB concentrates on high-rise construction. However, its technology can be applied to other building types, too. It is particularly well-suited to the hospital sector, for instance, since hospitals have such high operating and maintenance costs and could greatly benefit from the energy efficiency that BSB buildings allow.



Impact: Time, Cost, Environment & Quality

Time: A 57-storey building was completed in 19 days; traditional high-rise floor cycles can take 20-30 days per storey MINIMUM.

Cost: The case study reports potential reductions of 20–40% versus traditional in-situ construction.

Environment: Construction waste is reported at less than 1%, versus 5–10% for conventional buildings.

Energy: BSB buildings are reported at five times the energy efficiency of conventional Chinese buildings.

Quality: Lightweight steel construction and standardized manufacturing support quality and safety.



Why the moment is now in India

BUILDING TODAY FOR A STRONGER TOMORROW

INFRASTRUCTURE
INDUSTRY
OPPORTUNITY
INDIA RISING



Warehousing & logistics parks

Faster, larger and more efficient supply chains



Manufacturing expansion

Meet growing demand
Make in India



Metro & railway stations

Modern, durable and quick construction



Airports & terminals

World-class infrastructure for a connecting India



Data centers

Reliable, scalable and future ready



Housing & worker accommodation

Safe, comfortable and cost-effective living spaces

WHAT INDIA NEEDS



Skilled designers, detailers and fabricators

Build capacity for a growing market



Certified welders and NDT inspectors

Ensure quality and safety



Engineers who understand factory + site

Deliver practical, buildable solutions



Research on Indian conditions: climate, corrosion, seismic

Design for India's diverse environments



A connected, collaborative industry voice

Work together for stronger standards and greater opportunities

*Stronger Infrastructure
A Brighter India*

PEOPLE
PROJECTS
PROGRESS



Research frontier: low-carbon steel, design for reuse, embodied-carbon benchmarks for Indian buildings.

Safety is engineered, not hoped for



Working at height

Harnesses, lifelines, safety nets, MEWPs



Lifting operations

Lift plans, competent riggers, exclusion zones



Hot work

Fire watch, fume control, permits



Structural stability

Temporary bracing during erection



Culture

Permit-to-work, toolbox talks, stop-work authority



Indian standards (BIS)

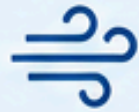
BUILDING A STRONGER INDIA

IS 800:2007



General construction in steel

IS 875 (Parts 1–5)



Design loads incl. wind

IS 1893



Earthquake-resistant design

IS 801 / IS 811



Cold-formed steel

IS 2062



Hot-rolled structural steel

IS 456



Concrete (foundations)



International references

GLOBAL KNOWLEDGE • WIDER POSSIBILITIES

AISC 360



Structural steel buildings (USA)

MBMA Manual



Metal building systems

AWS D1.1



Structural welding code

ASME Section IX



Welding qualifications

ISO 12944



Corrosion protection by paint

ISO 3834 / ISO 9712



Welding quality / NDT personnel

From Standards to Stronger Structures



IS 800:2007

IS 875 (Parts 1–5)

IS 1893

SAFER
STRONGER

AISC 360

AWS D1.1

ASME SECTION IX



COMPLIANT
DESIGNS



RELIABLE
STRUCTURES



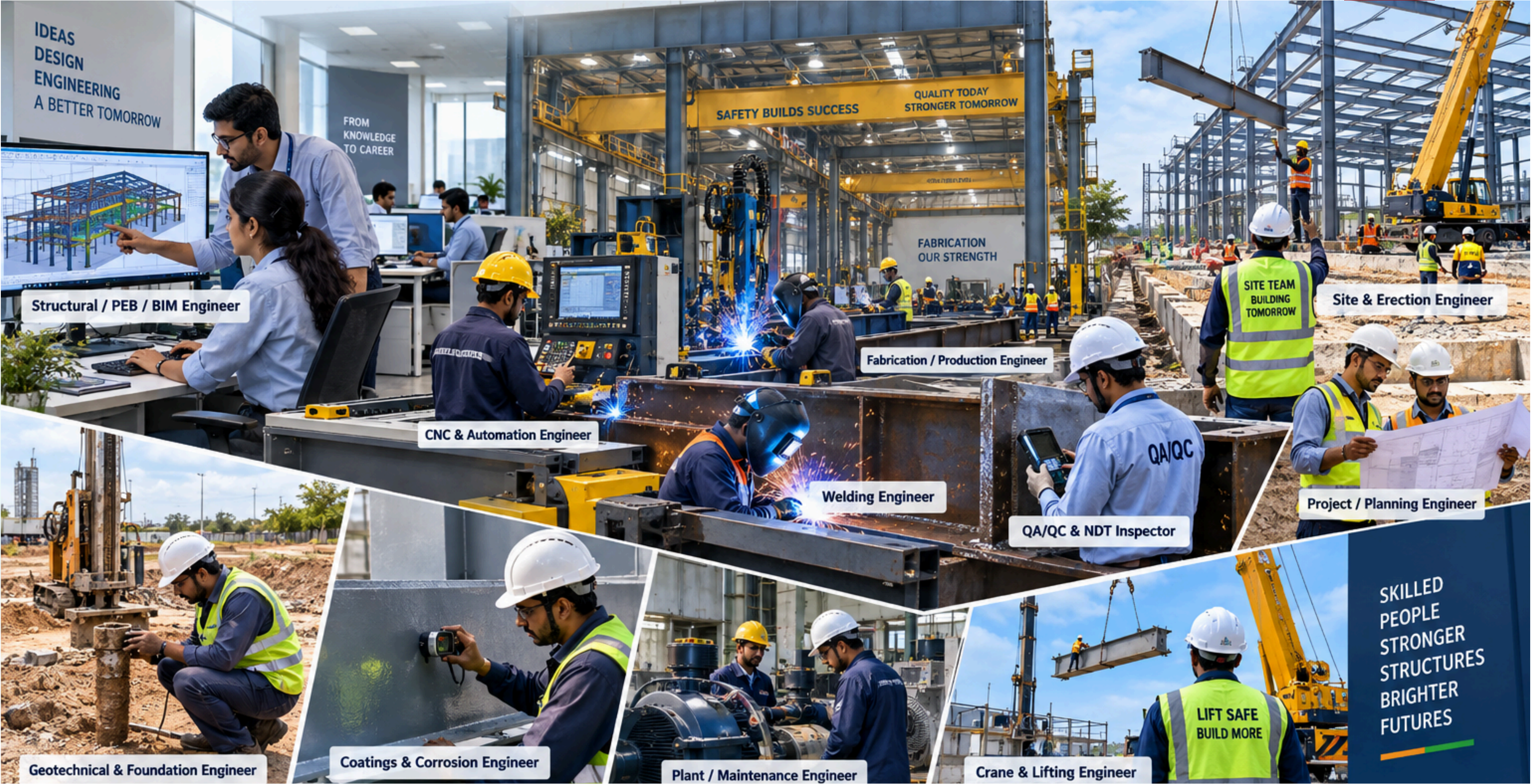
SUSTAINABLE
FUTURE



From knowledge to career

Every stage you have just seen
is a profession. Where do
you fit?





New-age roles that **barely existed** a decade ago

NEW TECHNOLOGIES | NEW OPPORTUNITIES | A SMARTER, MORE SUSTAINABLE TOMORROW

PEOPLE
TECHNOLOGY
SUSTAINABILITY
STRONGER BUILDINGS



BIM coordinator

Bringing design, construction and data together

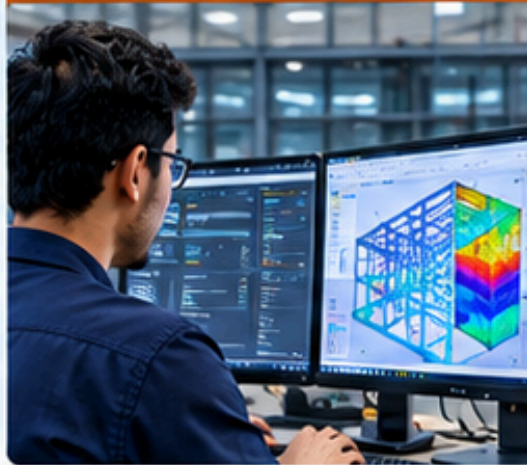


- ✓ Coordinate multi-disciplinary models
- ✓ Detect clashes and resolve issues
- ✓ Keep project information up to date



Computational designer

Using algorithms for smarter structures



- ✓ Use parametric and generative design
- ✓ Optimize for cost, weight and performance
- ✓ Turn ideas into buildable solutions



Robotics & automation engineer

Automating fabrication and construction



- ✓ Program and deploy robotic systems
- ✓ Improve speed, quality and safety
- ✓ Work with AI and automation technologies



Digital twin specialist

Creating a live digital copy of the real world



- ✓ Build and manage digital twins
- ✓ Use real-time data for better decisions
- ✓ Support operations and maintenance



Construction data analyst

Turning data into progress



- ✓ Analyse project data and trends
- ✓ Predict delays and cost overruns
- ✓ Enable data-driven decision making



Sustainability / LCA consultant

Building a greener future



- ✓ Assess environmental impact (LCA)
- ✓ Recommend sustainable materials
- ✓ Support green building certifications



Drone & reality-capture specialist

Seeing the site like never before



- ✓ Capture high-resolution site data
- ✓ Create 3D models and point clouds
- ✓ Track progress, safety and quality



Modular product engineer

Designing for speed and efficiency



- ✓ Design for modular and offsite construction
- ✓ Improve buildability and standardization
- ✓ Enable faster, safer and lower-cost delivery

PEOPLE BUILD THE FUTURE

INNOVATION TODAY.
STRONGER TOMORROW.



Fundamentals

Steel behaviour, stability, IS 800, load codes, connection basics




Software

One analysis tool + one 3D detailing / BIM tool — learned deeply




Shop floor & site

Plant visits, welding & NDT basics, erection exposure, internships




Professional skills

Communication, safety mindset, documentation, teamwork



YOUR 90-DAY PLAN



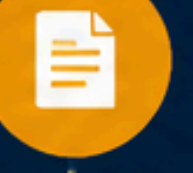
Days 1 – 30

Read IS 800 basics; model one portal frame




Days 31 – 60

Visit a fabrication plant or site; learn to read a shop drawing

Days 61 – 90

Build a small project in a detailing / BIM tool; share it



- ☒ Model
- ☒ Detail
- ☒ Document

Research frontiers with real industry demand

STRONGER RESEARCH | SMARTER SOLUTIONS | A SUSTAINABLE TOMORROW

Build
Research
Build a
Better Tomorrow

IDEAS
RESEARCH
INDUSTRY
IMPACT

01

Tapered-member & frame stability



Optimizing steel frames for higher strength and efficiency



02

Cold-formed steel behaviour & connections



Stronger connections for next-generation lightweight structures



03

Wind uplift & roof-sheeting performance



Safer buildings in extreme wind conditions



04

Corrosion & coatings in Indian climates



Longer life through advanced protection systems



05

Fire performance of light steel structures



Understanding behaviour for safer, resilient buildings



06

Robotic welding & weld-quality AI



Higher quality, productivity and consistency



07

Design automation & optimization



Smarter designs for faster, cost-effective solutions



08

Embodied carbon & design for reuse



Lower carbon. Greater value. A circular future.



REUSE
REBUILD
RECYCLE
LOWER CARBON



INDUSTRY
RELEVANT



INNOVATION
DRIVEN



SUSTAINABLE
SOLUTIONS



HIGHER
IMPACT

RESEARCH
BUILDS
A STRONGER
TOMORROW



Plant & site visits

Get real-world exposure to fabrication plants and live projects.



Internships & projects

Work on industry projects, gain practical skills and build your portfolio.



Student chapters

Join or start a student chapter in your college.



Guest lectures & webinars

Learn from industry experts, thought leaders and global practitioners.



Design competitions

Showcase your ideas, solve real challenges and win recognition.



Mentorship

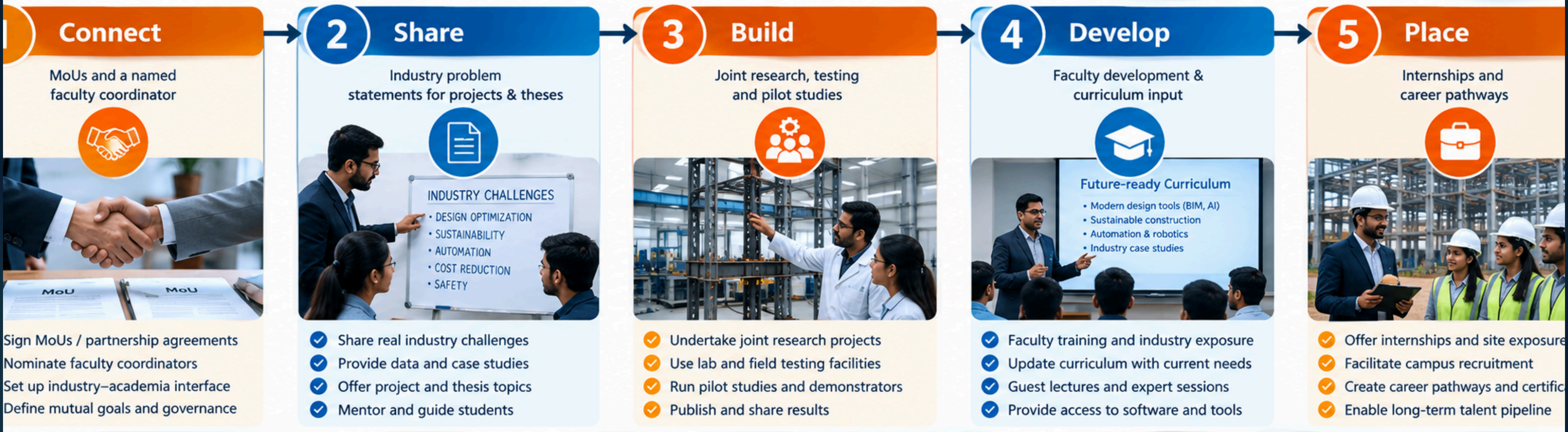
Get guidance from experienced professionals to shape your career.



How colleges & researchers can collaborate

PEOPLE | RESEARCH | INDUSTRY | SKILLS | A STRONGER TOMORROW

IDEAS
IN PARTNERSHIP
BUILD
REAL IMPACT



COLLABORATION
CREATES
STRONGER
BUILDINGS,
BRIGHTER CAREER

Start small: one visit, one problem statement, one joint project. Trust is built one collaboration at a time.

India is Evolving – A Bigger, Faster, Stronger Tomorrow

Modern Infrastructure | Sustainable Construction | Faster Delivery | Atmanirbhar Bharat

Metal Buildings will play a key role in India's next growth story

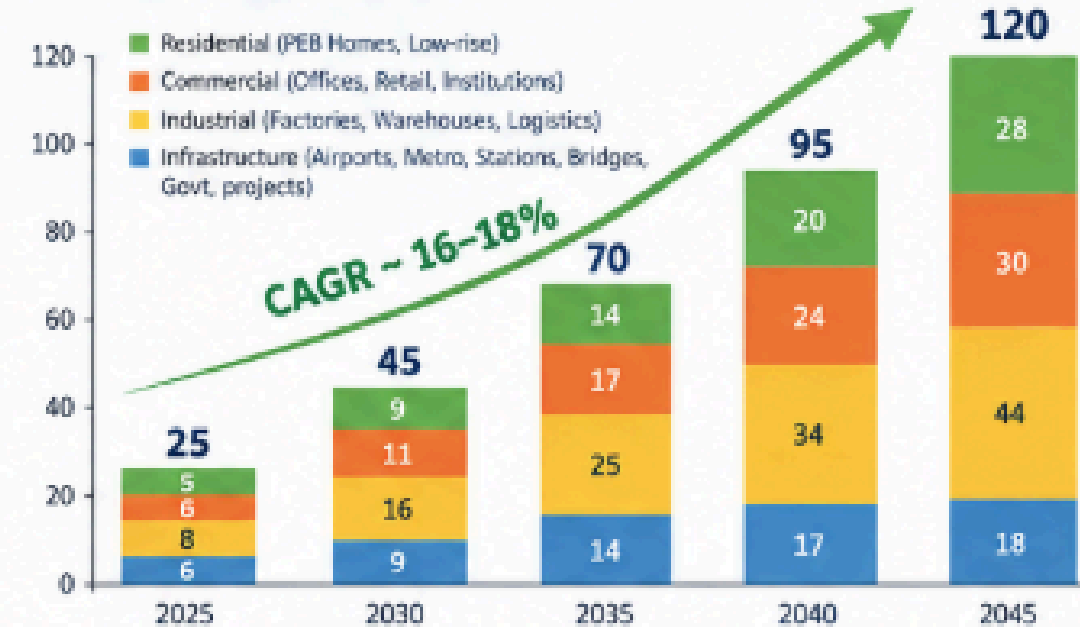
A DEVELOPED INDIA BY 2047

From Vision to Reality



Indian Metal Building Market Forecast (2025 – 2045)

Market Size (USD Billion)



Key Growth Drivers

- Massive infrastructure investment (roads, rail, metro, airports, ports)
- Industrial corridors & manufacturing growth
- Warehousing & logistics expansion
- Affordable housing & urbanization
- Faster, sustainable, cost-effective construction with metal buildings
- Make in India & Atmanirbhar Bharat
- Green & low-carbon construction
- Growing demand for pre-engineered buildings (PEB)

India Metal Building Market
will reach ~ **USD 120 Billion** by 2045

A Golden Opportunity for Industry, Innovators and Young Professionals

Build Faster. Build Smarter. Build a Stronger India.

FROM MATERIALS TO A BETTER TOMORROW

Different Products – Same Manufacturing Philosophy

AUTOMOBILE MANUFACTURING

Raw Materials In



Manufacturing & Assembly



Finished Product Out



- Standardized
- High Quality
- Mass Production
- Faster Delivery
- Global Supply Chain

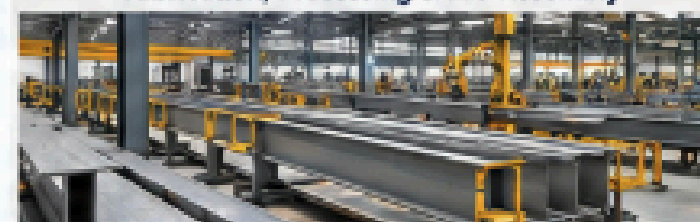
SAME PRINCIPLE. DIFFERENT SOLUTIONS. A STRONGER INDIA.

PRE-ENGINEERED METAL BUILDING (PEB) MANUFACTURING

Raw Materials In



Fabrication, Processing & Pre-Assembly



Finished Building Out



- Customised Designs
- High Strength
- Faster Construction
- Cost Effective
- Sustainable & Reusable

METAL BUILDINGS – BUILDING A SMARTER, GREENER FUTURE

SMART MANUFACTURING FOR A SMARTER TOMORROW

Every Beam. Every Column. A Digital Identity.



Barcode / QR Code Information

- Project Name
- Member / Fabricator ID
- Part Number
- Description (Beam / Column)
- Size & Material Grade
- Heat / Batch Number
- Fabrication Date
- Drawing Reference
- Erection Location
- Complete Traceability



Scan & View
3D Model, Drawings
and Erection Details
on Site



DIGITAL. TRACEABLE. EFFICIENT. RELIABLE.
FROM FACTORY TO FOUNDATION – COMPLETE VISIBILITY



CONNECT | COLLABORATE | CREATE | CONSTRUCT | CERTIFY+

INDIAN METAL BUILDING FORUM (IMBF)

Questions & discussion

Let's build ideas for a stronger, more sustainable future.

Thank you

Srinivasan Balaji

Founder, Indian Metal Building Forum (IMBF)

BUILD
CONNECT
COLLABORATE
FOR A STRONGER
TOMORROW



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SUSTAINABLE
BUILDINGS



STRONGER
COMMUNITIES



INDUSTRY
GROWTH



BRIGHTER
TOMORROW

*Together
We Build
Better*

Thank You

**To the Management
and Civil Engineering Department
PSG Institute of Technology and Applied Research
(PSG iTech)**

