Why Steel?

Can you imagine this without steel?

Sleek but robust

Simple yet elegant

Gold (Handheld) Bridge on Ba Na hill near Danang city, Vietnam.
Benefits of Steel Framed Structures

- Speed of Construction
- Lower Project Cost
- Aesthetic Appeal
- Design Flexibility
- High Strength
- Ease of Design
- Sustainable
- Innovative
- Modifiable
- Efficient
- Reliable & Predictable
- Readily Available

Major Consumers

- Construction / Infrastructure Sector
- Engineering Industries
- Railways / Roadways
- Automotive
- Packaging and others
Recent advances in steel products

- High Tensile Structural Steels
- Fire Resistant Steels
- Corrosion Resistant Steels
- Coated / Galvanized Products
- Stainless Steels

Availability of various shapes

- Parallel flange sections
- Cold formed sections
- Hollow structural tubes
- High tensile wire ropes
Blending materials

- Steel & Concrete
- Steel & Glass
- Steel & Rockwool

Blending materials

- Steel & Aluminium
- Steel & Rubber
- Steel & Gypsum board
Sustainable Development Index

India is ranked at a low 116 of 157 nations with regard to achieving the Sustainable Development Goals, as per the Sustainable Development Goal Index prepared by The Sustainable Development Solutions Network (SDSN) – A Global Initiative for the United Nations

It’s time for decision makers to consider how their actions will affect future generations.

Goal 11: Sustainable cities and communities

Make cities inclusive, safe, resilient and sustainable

- Transform the way we build and manage our urban spaces
- 100 smart cities
- Ensure safe and affordable housing
- Upgradation of slum settlements
- Investment in public transport
- Creating green buildings
Goal 12: Sustainable Consumption & Production

Ensure sustainable consumption and production patterns

- Reduce carbon footprint by changing the way we produce and consume resources
- Encouraging industries, businesses and consumers to recycle

Sustainability

- Environmental
- Social
- Economic

A truly sustainable structure must reduce economic and social impacts. Steel Constructions offer benefits to all three issues.
Building Sector

Commercial and Residential sectors are responsible for about 5.25% of India’s Green House Gas (GHG) emissions in terms of CO$_2$ equivalent.

This implies that India’s sustainable development targets cannot be met without a fundamental change to the way in which buildings are constructed.

Source: Statistics Related to Climate Change – India 2015, www.mospi.gov.in

Role of Steel

Steel, an inherently sustainable building material, is poised to play a significant role in helping the construction sector achieve its ambitious sustainable goals.

Steel is the most recycled material on the planet, more than all other materials combined*.

* American Iron and Steel Institute
Role of INSDAG

Working with Government to meet the objectives of its sustainable construction strategy

Providing design guidance and information that allows designers to create buildings with reduced life-cycle costs and environmental burdens.

Providing design guidance and information that allows designers to create buildings that can achieve the highest LEEDS / Equivalent ratings.

Continuing to disseminate research and development findings to help reduction of carbon footprint.

Providing architects and procurement agencies the opportunity to identify key supply partners that share a commitment to sustainable construction.

Environmental and Economic benefit of Steel

- Fast
  - Quicker ROI
  - Reduced cost of preliminaries
  - Fewer disruptions and disturbances

- Manufactured
  - Assured quality

- Safe
  - Minimum on-site handling
  - Endlessly recyclable / Zero Waste
  - After recycle, retains properties and value

- Zero Waste

Four Pillars
Social benefits of Steel

- **Rapid Construction**
  - Less disruption to community
  - Fewer vehicle movement to site
  - Little on-site noise and waste

- **Relocable**
  - Without noisy & dusty demolition
  - Recovery rate of steelworks and steel products from demolition sites is over 95%
  - Beneficial to local community

- **Skilled Workforce**
  - No itinerant Workers
  - Stable employment
  - Steelwork does not use Water – Most valuable resource

- **Long Spans**
  - Bright & airy building
  - Pleasure to live & work in
  - Never look tired & outdated

Innovations

- Steelwork is becoming increasingly
  - Pre-Engineered
  - Easier and certain pre-planning
  - Increased accuracy & reduced liability to errors
  - Less site hazards
  - Improved Health and safety
  - A VITAL Social Sustainable Factor
Innovations

Offsite and Components

- Light gauge Cold-Formed sections
- Hollow Sections
- Steel Floors
- Sandwiched Panels
- Steel Sections with higher Yield Strength (> 410 Mpa)

Increased use of factory-made precision components

Reduced site based adjustments and hazards

Life Cycle Cost Analysis (LCCA)

Physical infrastructures deteriorate after years of continuous usage and exposure to climate

Annual maintenance and modernization cost is 2%–20% of CAPEX*

(LCCA) is tool to determine the most cost-effective option among different appropriate & competing alternatives

LCCA for infrastructure assets is mandatory in South Africa and Malaysia

*Report on Indian Urban Infrastructure and Services, Ministry of Urban Development, GoI
Real life Case Study

Project : 22 Storeyed (1.2 mn. Sq. ft) Commercial Building, Bangalore

<table>
<thead>
<tr>
<th>Cost of RCC Construction (in Rs Crores)</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Construction costs with all materials</td>
<td>133.0</td>
</tr>
<tr>
<td>Rental Costs (incurred due to delayed completion)</td>
<td>39.0</td>
</tr>
<tr>
<td>Weather Impacts</td>
<td>3.0</td>
</tr>
<tr>
<td>Net Carpet Area (due to internal columns)</td>
<td>8.0</td>
</tr>
<tr>
<td>Cost of Steel Construction (in Rs Crores)</td>
<td></td>
</tr>
<tr>
<td>Construction costs with all materials, civil foundations, Miscellaneous</td>
<td>151.0</td>
</tr>
</tbody>
</table>

Steel construction is **17.5 %** lower than RCC construction

Project commissioned by : JSSL, Mumbai
Data compiled by : JSSL, Mumbai

Benefits of LCCA

<table>
<thead>
<tr>
<th>Building Description</th>
<th>Cost Advantage (%)</th>
<th>Remark</th>
</tr>
</thead>
<tbody>
<tr>
<td>G + 3 with strip foundations</td>
<td>8.22</td>
<td>Storey Height – RCC (3.0 m) and Steel (2.85 m)</td>
</tr>
<tr>
<td>G + 3 with Pile foundations</td>
<td>7.03</td>
<td>Storey Height – RCC (3.0 m) and Steel (2.85 m)</td>
</tr>
<tr>
<td>G + 6 with Pile foundations</td>
<td>10.70</td>
<td>Storey Height – RCC (3.0 m) and Steel (2.85 m)</td>
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<tr>
<td>B + G + 20 with Pile foundations</td>
<td>8.72</td>
<td>Storey Height – RCC (3.15 m) and Steel (3.00 m)</td>
</tr>
<tr>
<td>3B + G + 40 with Pile foundations</td>
<td>25.97</td>
<td>Storey Height – RCC (3.5m) and Steel (3.2 m)</td>
</tr>
</tbody>
</table>

Base of Comparison : Conventional RCC construction with brick walls with Steel – Concrete Composite construction with brick walls

Source: INSDAG Study
STEEL IN CROSSING STRUCTURES

long plate girders being erected for a fly-over

Courtesy: STUP Consultants
STEEL IN CROSSING STRUCTURES

Park Street flyover – steel composite construction

STEEL IN CROSSING STRUCTURES

Steel box mandatory span being erected – Lock gate crossing

Courtesy: STUP Consultants
STEEL IN CROSSING STRUCTURES

Steel composite crossing over road

RAILWAY BRIDGES
Pamban Bridge
Connects Pamban island to mainland India
Cantilever Bridge
First Sea Bridge, 1914

Jubilee Bridge (Sampreeti Bridge)
Old Bridge – 1887
New Bridge – 2016
415 m long
Bogibeel Bridge

Road cum Rail Bridge
4.94 km long
Expected inauguration – End of 2018

STEEL IN BUILDINGS
FOUR SEASONS HOTEL WORLI, MUMBAI

The tallest hotel building in India…

Good example of Composite Construction using structural steel up to service floor

THE ITC GRAND MARATHA SHERATON HOTEL, SAHAR, MUMBAI

Courtesy: STERLING Engineering, Mumbai
ITC GRAND CENTRAL, LOWER PAREL, MUMBAI

J K HOUSE, BREACH CANDY, MUMBAI

COMPOSITE COLUMNS
USED TO ACHIEVE
MINIMUM CROSS-SECTION
AT LOWER FLOORS

Courtesy: STERLING
Engineering, Mumbai
THE ICICI HEADQUARTERS, Bandra Kurla Complex, Mumbai

THE ICICI REGIONAL HEADQUARTERS, Hyderabad

Courtesy: STERLING Engineering, Mumbai
Inside view
Steel girder with deck sheets

Steel Sheet Decking

THE ICICI REGIONAL HEADQUARTERS, Hyderabad

Courtesy: STERLING Engineering, Mumbai
Each box shaped wing comprises of 3 floors and 1 terrace floor

Two plate girders span 22.5m
SUNSHINE TOWER
DADAR, MUMBAI

The tallest commercial,
Steel-framed building in India

Column free office space
Measuring 21m x 16m

SUNSHINE TOWERS, MUMBAI
OFFICE BUILDING

• COMPOSITE CONSTRUCTION
• HEIGHT (APPROX) 165 MTS
• SQUARE COLUMNS ALONG
  PERIPHERY – 500mm x 500mm
  SPECIALLY IMPORTED FROM
  JAPAN, SUPPLIED BY CORUS
STEEL IN RURAL HOUSING

SUNSHINE TOWER, MUMBAI

Courtesy: STERLING Engineering, Mumbai
LOW COST HOUSE FOR RURAL POPULATION IN INDIA

INSDAG developed an innovative design and construction methodology of low cost house for poor rural population in India following Architectural guidelines of GOI under PMAY-G

Construction Cost Rs. 800/- per Sq. Ft.

INSDAG has applied for its patent

Prototype installed at NIRD, Hyderabad

Steel Intensive Model Rural House

Photo of Rural House at Talegaon
Steel Intensive Model Rural House

Model House at Burdwan, WB

STEEL IN CAR PARKS
CROSS ROADS 2, NARIMAN POINT, MUMBAI

Multi-level car park floor

STEEL IN PUJA
PANDALS
Freedom of Expression with STEEL

STEEL IN PUJA PANDALS
Ahiritola Puja Pandal Kolkata

IN INTERNAL DECORATION

THANK YOU

Director General
INSTITUTE FOR STEEL DEVELOPMENT & GROWTH (INSDAG)
793, Anandapur, Kolkata – 107, www.steel-insdag.org , ins.steel@gmail.com