

# Structural Steel Fabrication Widely Changing the Construction Preference in Raigarh

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**Abstract-** *The construction industry in Raigarh is undergoing a significant transformation as structural steel fabrication becomes increasingly preferred. This paradigm shift is driven by the many advantages steel offers as a building material. Steel structures are known for their strength, durability and resistance to external forces, making them ideal for skyscrapers, bridges and industrial buildings. Additionally, the external manufacturing process of the steel components enables precision manufacturing, reducing construction time and costs while promoting sustainability. The versatility of steel manufacturing enables innovative building designs and maximizes space utilization. Challenges such as skill shortages and specialized infrastructure can be overcome by investing in training programs and research. Raigarh reliance on structural steel production promises increased construction efficiency, improved safety and a more sustainable built environment.*

**Indexed Terms-** *Structural Steel Fabrication, Construction Industry, Paradigm Shift, Strength and Durability*

## I. INTRODUCTION

Steelmaking is the process of manufacturing steel products through metal secondary processing. Examples of these processes include cutting, bending and joining. Additional processes such as finishing and heat treatment are performed to give additional properties to metal products. Steel processing is an important industry that covers almost all sectors of industry.

Steel products are essential to construction, transportation, energy, mining, agriculture and the manufacture of consumer goods. The steel manufacturing process is performed by trained steel fabricators who perform the cutting, bending and

forming processes. They are highly qualified professionals with knowledge of steel properties and properties.

Various parts of steelmaking in steelmaking he has three basic parts.

Smelting the raw material, mixing the molten material with the steel, and forming the steel into the desired shape. The whole process is very complicated with little to no room for error and requires people with special skills to do everything properly. This process is widely used by steel manufacturers to produce all types of steel parts and details.

- Bar joists;
- Ladders;
- Grating;
- Skids;
- Universal beam
- Pipe racks

## Objective of the Study

- To assist clients, nationwide, by providing solutions within a developing area of engineering expertise.
- To expand business by offering the best in quality, cost and programme.
- To provide employees with the opportunity to develop their full potential within a safe and congenial environment.
- To seek a competitive advantage by developing suppliers and subcontractors.
- To contribute actively to the communities in which we operate.

## II. LITERATURE REVIEW

Following research work has been carried out related to the analysis, design and optimisation of steel structure:

Sh Hosseinzadehet. al., (2016) focused on evaluation of all steel buckling restrained braces using finite element method: this illustrates the study on finite element analysis of ten BRB specimen with varying gap size between the steel core and restrainers under seismic forces. 10mm air gap found to be very effective in dissipating energy. Finite element of Bi linear derived back bone curve of the effective BRB were used to retrofit three frames i.e. 4 storey, 8 storey and 12 storey. Static pushover curves of the steel structures show that all BRB is more ductile than compared to the old x bracing. Response modification factor for BRB was more as compared to x bracing because of the ductility factor.

Swaminathan Krishnan et. al. (2006) studied the responses of high rise steel moment frame structures in scenario magnitude 7.9 earthquakes on the southern San Andreas Fault. The authors used three-dimensional, nonlinear finite elements models of pre-constructed 18th story moment frame building and re-designed the same to satisfy the 1997 uniform building code. The authors found that the simulated responses of the pre constructed buildings indicate the potential for significant destruction along the San Fernando and Los Angeles basins. The modified building does better, but still showed signs of deflection and damages in some portions. The ruptures that propagated north-to south induced much larger building responses than the rupture that propagated south-to-north on the southern San Andreas.

3A joghataie and M. Takaloozadeh (2009), in their paper proposed a new penalty function which has superior convergence properties as common exterior and interior penalty function does not show such superior properties. They used the new and old interior and exterior penalty function in conjunction with the steepest descent method to three-bar truss and ten-bar truss and then they compared the results. It was concluded that the convergence speed and accuracy of the result were improved.

- Limitations  
The limitations of this study are-
  - a. It includes only the Steel fabrication in future effect on using steel
  - b. The area of research is only limited to Raigarh Area.

- c. As this research is purely based on the steel fabrication customer satisfaction owner’s in product, it may differ to the reality.

RESEARCH METHODOLOGY AND DESIGN OF THE REPORT TABLE

Nature of the study	Exploratory research
Type of data	Primary data and Secondary data
Method of data collection	Questionnaires
Nature of population	The customers of Raigarh City are the population of the study.
Sampling unit	Sample unit is the clients in Raigarh & Odisha.
Sampling method	Convenience sampling
Sample size	50

FINDINGS

This study on “Structural Steel Fabrication widely changing the construction preference with in Raigarh Chhattisgarh.

By comparison, fabricated steel structures spend obviously less time on construction than reinforced concrete frames, which highlights the superiority of steel structures. Meanwhile, through comparing steel tubular frames with the mixed ones, it could be easily found that the former has an outstanding advantage on construction period for the employment of fully fabricated node connections rather than vast welding connections for the latter.

CONCLUSION

In conclusion, the global 'Structural Steel Manufacturing Market' has significant growth potential during the forecast period, with North America and Europe playing a key role. The market is expected to grow notably in terms of size and “CAGR” owing to advancements in “technology” and presence of major players. As the industry continues to recover globally, an attractive investment climate still exists,

attracting new business and setting the stage for future development. Steel structures have several advantages over RCC (Reinforced Concrete) structures, which is why they are preferred in certain construction scenarios. Here are some reasons why steel structures are considered superior in certain situations:

1. **Strength and Durability:** The high strength-to-weight ratio allows steel to withstand high loads while being relatively light. It is stronger than concrete and has excellent tensile strength, making it ideal for structures that require long spans and heavy loads. Steel structures are also highly resistant to natural forces such as earthquakes, hurricanes and high winds.

2. **Flexibility and Design Freedom:** Steel is highly malleable and can be worked into a variety of shapes, making it more versatile and creative in design. This flexibility makes it suitable for building complex structures with unique architectural features. Steel structures can be easily modified, expanded and reused, making them more adaptable to changing requirements.

3. **Construction speed:** In general, steel structures are built faster than his RCC structures. Prefabricated steel structural components can be manufactured off-site, reducing on-site construction time. This advantage is especially valuable for projects with tight schedules or where minimizing disruption to existing operations is critical.

4. **Cost Effectiveness:** The initial cost of steel can be higher than concrete, but the advantages in strength, durability and speed of construction can offset the overall cost of the project. Reducing the weight of steel structures leads to a reduction in foundation costs. In addition, by shortening the construction period, labor costs and related costs can be reduced.

It is important to note that the choice between steel and RCC structures depends on many factors such as project requirements, budget, site conditions, local codes, and architectural preferences. In some cases, especially in smaller projects or situations where other considerations outweigh the benefits of steel, RCC may still be preferred.

## REFERENCES

- [1] Sh Hosseinzadeh, B. Mohebi, “Seismic evaluation of all steel buckling restrained braces using finite element analysis”, *Journal of Constructional Steel Research* 119 (2016) 76-84.
- [2] Swaminathan Krishnan, Chen Ji, Dimitri Komatitsch, and Jeroen Tromp, “Case Studies of Damage to Tall Steel Moment-Frame Buildings in Southern California during Large San Andreas Earthquakes”, *Bulletin of the Seismological Society of America*, Vol. 96, No. 4A, pp. 1523–1537, August 2006.
- [3] Yanlin G, Xiaoqiang C (2004) Several technical problems and discussions in the construction of large-span complex steel structures. *J Ind Archit* 12:1–5, 22
- [4] White D W, Chen W F. *Plastic Hinge Based Methods for Advanced Analysis and Design of Steel Frames: An Assessment of the State-of-the-Art*. Bethlehem, Pennsylvania: Structural Stability Research Council, 1993, 299
- [5] Attala N M, Deierlein G G, McGuire W. Spread of plasticity: quasi-plastic-hinge approach. *Journal of Structural Engineering*, 1994, 120(8): 2451–2473