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Comparison among Conventional Metal Systems and Tubular Metal Structures

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ABSTRACT

Maximum of the metal systems is built up with conventional sections of steels that are designed and built through conventional methods. This ends in heavy or uneconomical structures. Tubular metal sections are the great replacements to the traditional ones with their beneficial and comparatively better residences. Its miles apparent that due to the profile of the tube section, dead weight is likely to be decreased for lots structural members .which derives ordinary economy. This study is concerning the financial system, load wearing ability of all structural participants and their corresponding protection measures. Economy is the main goal of this look at regarding assessment of conventional sectioned systems with tubular sectioned structure for given necessities. For look at purpose superstructure-part of a business building is taken into consideration and evaluation is made. Examine famous that, up to 40 to 50% saving in value is performed by means of using tubular sections.
Keywords - STAAD.Pro V8i, IS 806, IS 800, IS 875, Steel Table, Tabular Section

I. INTRODUCTION

1.1General

This look at is set designing components of commercial homes using conventional steel sections, rectangular tube, circular tube and square tube sectioned and assigns maximum appropriate segment according to its useless weight and simplicity of connection techniques. Tubular sections are an economical, green and robust alternative to traditional sections used in metal structure.

1.2 ADVANTAGES OF TUBULAR SECTIONS

- For tubular sections, better energy to weight ratio may want to bring about 25 to 30% financial savings in metallic.
- Due to the excessive tensional pressure and compressive power, Tubular sections behave greater efficaciously than traditional steel phase.
- For dynamic loads tubes have better frequency of vibration than another rolled section.
- Ease of preservation.
- Free from sharp edges.
- Ease of fabrication and erection.

1.3 Problem

To determine the effectiveness of tubular sections an industrial shed is taken into consideration evaluation and design is done using traditional metal sections and tubular metallic sections. In tubular round square and square shapes are taken in to consideration. Price assessment is made for all above sections.

II. EXPERIMENT PROGRAM

Following data is taken into consideration for analysis and design of commercial shed.

2.1 Data For Industrial Building

- Plan area around:- 800 sq.m.
- Location:- Bhopal, Kolar Area, MP India.
- Roof Truss:- Modified Howe type
- Geometry of Truss:- Span-24 m, Angle:- 16.260
- 10 Panel points spacing of purlin 1.425 m.
- Length of sheet:- 3.05 m, Slopping length:- 12.5 m.
- Spacing of Truss:- 5 m, No of Trusses:- 8

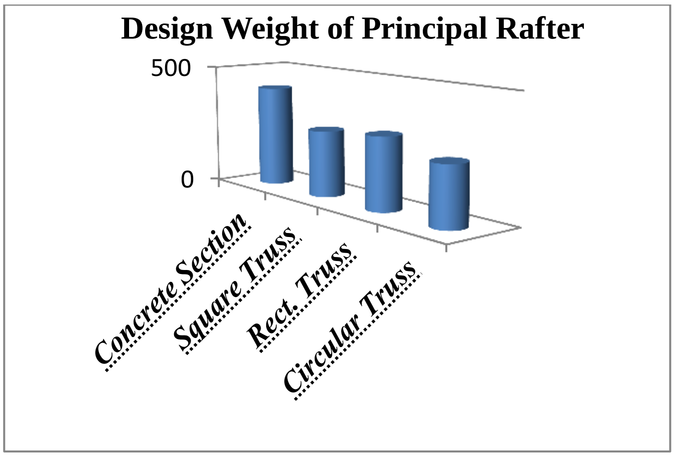
2.2 Approach

1) Dead load analysis is done according to IS 875 (Part I) with the help ofSTAAD-PRO.
2) Live load analysis is done according to IS 875 (Part II) with the help of STAD-PRO.
3) Wind load analysis is done according to IS 875 (Part III) with the help of STAD-PRO.
4) Designing is done according to IS 800, IS 806 and STAD PRO.
5) Conventional design is carried out as per IS 800 and Tabular sectioned design is carried out as per IS 806.

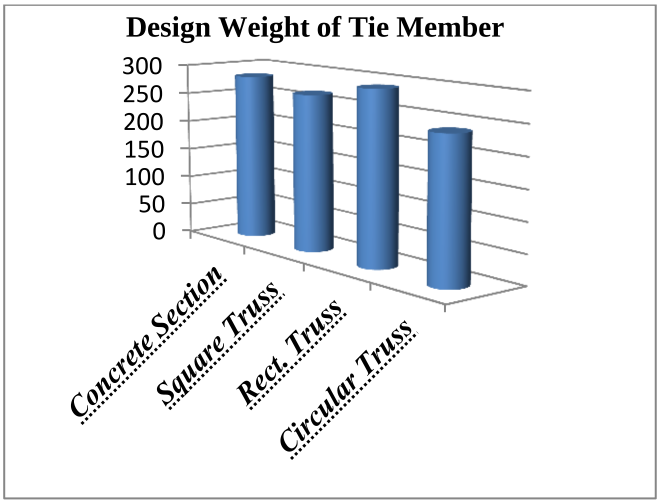
III. RESULTS AND DESCUSSIONS

A. Total Dead Load
  1) On central purlin =4.234kN
  2) On intermediate purlin=3.94kN
  3) On end purlin=2.7 kN
B. Total Live Load
  4) On central purlin =2.849kN
  5) On intermediate purlin=2.5241kN
  6) On end purlin [1.1]/2 x cos16.26 x 5 x 0.41653=1.099kN
C. Total wind load
  7) On central purlin= -7.5981kN
  8) On intermediate purlin=-6.533kN
  9) On end purlin=-2.846 kN

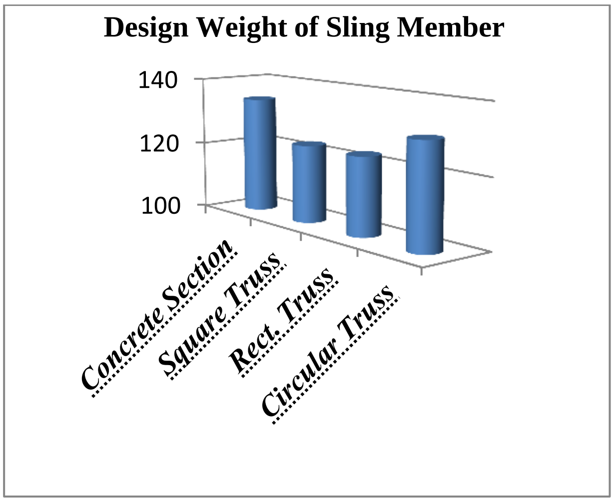
The usage of above consequences layout is completed for required load sporting ability. Most beneficial sections are assigned to truss contributors and purlin contributors. Comparison is made for self weight and fee of diverse elements of truss which includes principal rafter, tie member, strut member, sling member, purlin member. Outcomes for single truss are offered graphically in graph 3.1 to graph 3.5. These effect indicates that good sized quantity of saving is done the use of Tubular sections. Additionally analysis is achieved for general region of 800 squarem. Consisting eight numbers of trusses. In this case also evaluation is made for diverse elements of truss. Outcomes are provided in tabular shape i.e. table 3.1 to table 3.5. Study exhibits that significant saving in value can be achieved by the use of tubular sections.



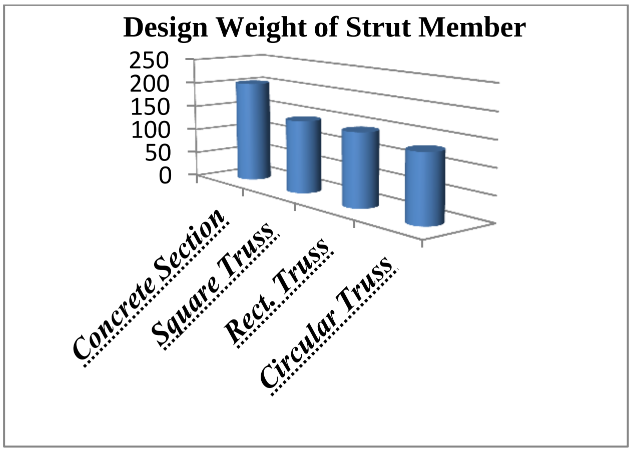
Graph 3.1 Variation of Design Weight for Principal rafter



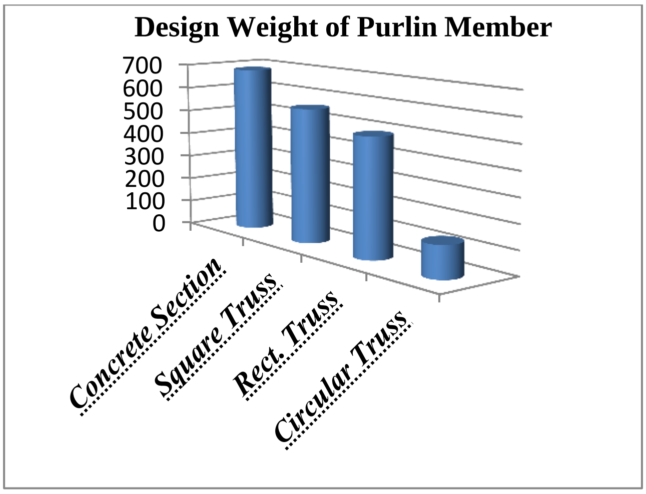
Graph 3.2 Variation of Design Weight for Sling Member



Graph 3.3 Variation of Design Weight for Sling Member



Graph 3.4 Variation of Design Weight for Strut Member



Graph 3.5 Variation of Design Weight for Purlin Member

Table 3.1 Comparison for Principal Rafter

Section	Conven-tional	Square Tube	Rectangular Tube	Circular Tube
Section	ISA65X65X6	80x80x4.8	122x61x4.5	o.d. 114.3, n.b.100,t=3.6
Weight in (Kg/m)	9.8	9.66	11.88	6.42
Weight for 8 Trusses (Kg)	3814.4	1236.4	1520.64	822.08
Reduction in Kg		142.96	-54.83	1198.75

Table 3.2 Comparison for Strut Member

Section	Conve-ntional	Square Tube	Rectang-ular Tube	Circular Tube
Section	ISA65X65X8	60x60x3.2	80x40x3.2	o.d60.3, n.b50,t=3.6
Weight in (Kg/m)	7.7	5.5	5.5	5.03
Weight for 8 Trusses (Kg)	1624.51	1160.48	1160.48	1061.20
Reduction in Kg		464.03	464.03	563.31

Table 3.3 Comparison for Tie Member

Section	Conven-tional	Square Tube	Rectang-ular Tube	Circular Tube
Section	ISA70X70X8	80x80x4.8	122x61x4.5	o.d114.3, n.b100,t=3.6
Weight in (Kg/m)	16.6	10.87	11.88	9.75
Weight for 8 Trusses (Kg)	3320	2174	2376	1950

Reduction in Kg		1146	944	1370

Table 3.4 Comparison for Sling Member

Section	**Conven-tional**	**Square Tube**	**Rectang-ular Tube**	**Circular Tube**
Section	ISA50X50X6	50x50x3.2	60x40x2.9	o.d48.3, n.b40,t=4
Weight in (Kg/m)	4.5	4.12	4.12	4.37
Weight for 8 Trusses (Kg)	1073.52	982.8	982.8	1042
Reduction in Kg		90.72	90.72	31.02

Table 3.5 Comparison for Purlin Member

Section	**Conven-tional**	**Square Tube**	**Rectang-ular Tube**	**Circular Tube**
Section	ISA125x95x12	113.5x113.5x4.8	122x61x5.4	o.d 139.7,n.b125,t=4.5
Weight in (Kg/m)	19.6	15.92	14.01	15.00
Weight for 8 Trusses (Kg)	13720	11144	9807	10500
Reduction in Kg		2576	3913	3220

IV. TOTAL COST

[1]. Total cost for modified Howe truss using conventional sections:
Rs 1, 64,669.26

[2]. Total cost for modified Howe truss using square tube sections:
Rs 93,103.99/-.
(% saving in cost=43.46%)

[3]. Total cost for modified Howe truss using rectangular tube sections:
Rs 88,987.26/-
(% saving in cost=45.96%)

[4]. Total cost for modified Howe truss using circular tube sections:
Rs 71,647.59/-
(% saving=56.49%)

V. CONCLUSION

Above study reveals that tubular sections proves to be most economical. overall saving of just about 50% to 60 % in cost is accomplished. Out of circular, rectangular and square shapes, due to connection problems of roundtube sections, it is cautioned to adopt rectangular or square tube sections. This have a look at is for a given vicinity of 800 sq.m. and truss of modified howe type. Effectiveness of Tubular segment may be validated for distinct plan areas for numerous kinds of trusses. From above observations and effects you can actually conclude that, the structural contributors having large unsupported lengths can be assigned tubular sections so as to derive ordinary economy. For smaller unsupported lengths one will should assign minimum sections for both conventional and tubular sections so that economy isn't always appreciably done. In such cases because of large preliminary fee it becomes uneconomical. Preliminary value for tubular sections is extra but, due to discount in overall dead weight, its miles usual low-cost now not handiest for business homes butadditionally for diverse metallic systems like transmission towers, bridge systems and so on.

VI. REFERENCES

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