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OPTIMIZATION IN INDUSTRIAL STEEL BUILDING BY USING DIFFERENT SECTION

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ABSTRACT
Buildings & houses are one of the oldest construction activities of human beings. The construction technology has advanced since the beginning from primitive construction technology to the present concept of modern house buildings. The present construction methodology for buildings calls for the best aesthetic look, high quality & fast construction, cost effective & innovative touch. Pre Engineered Steel Buildings are manufactured or Produced in the plant itself. The detailed structural members are designed for their respective location and are numbered, which cannot be altered; because members are manufactured with respect to design features. An efficiently designed pre-engineered building can be lighter than the conventional steel buildings by up to 30%. Lighter weight equates to less steel and a potential price savings in structural framework.

This also covers the advantages of hollow sections in its effectiveness to reduce corrosion, minimizing overall cost, and improvement in aesthetic value. The study involves the comparative analysis industrial steel building using sections under the influence of usual loading values. It also covers comparative study of section properties and its attributes and wide application in architecture, industrial, infrastructural and general engineering.

KEYWORDS: IS 800-2007, IS 806, IS 2062, IS 875, IS 1161.

INTRODUCTION
How to meet the housing and infrastructural needs of society in a sustainable manner in unquestionably most important challenge confronting the steel industry today. This study about design components of industrial building using open sections, tubular sections and pre-engineering concept. This sections are designed by using most suitable cross sections according to dead load, live load, wind load, etc. As a results the structure will loss its weight upto 35% during specified life span. In PEB construction is simple design easy to construct and light in weight both time and cost of erection are minimized. Outstanding architectural design can achieve at low cost using standard architectural features and interface details. In conventional steel building special architectural design and features must be developed for each project which often required results and thus resulting in much higher cost. Future expansion would more difficult and more likely, costlier than tubular sections and open sections.

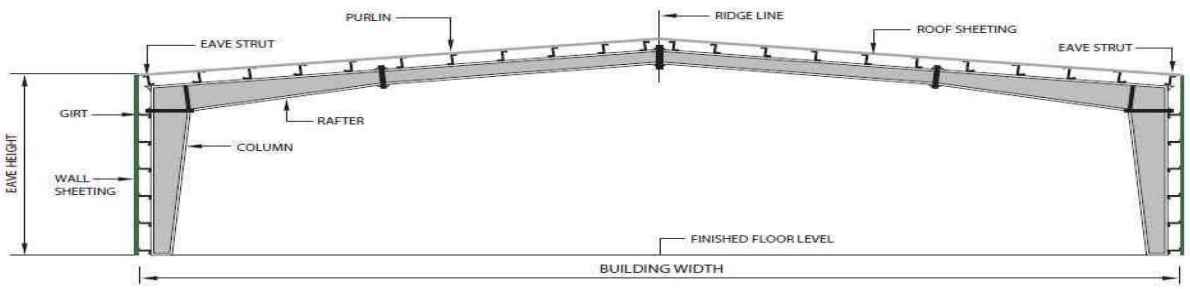

Fig. 1 Typical Cross section of PEB

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ANALYSIS AND DESIGN

Data required for analysis and design of Industrial Shed,
Plan Area= 640mm^2
Location= Pune ; Roof Truss= Pratt

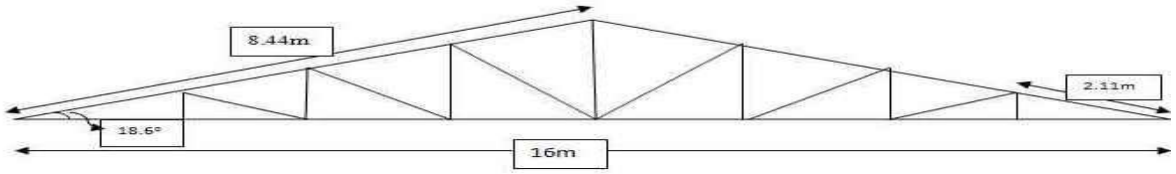

Fig.2 Truss Diagram

Geometry:- Span=16m ; ∅ =18.6^0
8Panel point spacing of purlins=1.75m
Type of sheet= G.I. :Length of sheet=3.05m
Sloping length=8.44m
Spacing of truss=4m; No. of trusses= 8

Table 1: Load combinations of members

	1.5(DL+LL)	NATURE	1.5(DL+WL)	NATURE	1.2(DL+LL+WL)	NATURE
TIE						
L_0L_1	103.98	T	64.32	C	7.764	C
L_1L_2	103.98	T	64.32	C	7.764	C
L_2L_3	89.94	T	50.34	C	2.064	C
L_3L_4	92.16	T	26.58	C	25.092	T
Principal rafter						
L_0U_1	109.72	C	88.305	T	28.14	T
U_1U_2	103.33	C	77.16	T	15.42	T
U_2U_3	76.335	C	56.88	T	13872	T
U_3U_4	52.72	C	33.28	T	5.124	T
SRUT						
U_1L_1	0		0		0	
U_2L_2	4.39	T	5.01	C	2.172	C
U_3L_3	6.19	T	7.92	C	3.576	C
U_4L_4	7.5	T	8.95	C	3.948	C
SLING						
U_1L_2	13.86	C	0.69	T	5.232	C
U_2L_3	19.47	C	24.82	T	11.196	T
U_3L_4	23.58	C	28.06	T	12.336	T

SUMMARY

Table 2: Summary of Sections in Structure

Sr. No.	Description	Open Section	Tubular Section
1	Principal Rafters	2 ISA 60x60x5	90mm N.D ; 101.6mm O.D of Light weight
2	Main Ties	2 ISA 50x50x6	
3	Struts	ISA 50x50x6	
4	Slings	ISA 50x50x6	
5	Purlins	ISMC125	50mm N.D
6	Columns	ISLB250	ISLB 250

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RESULTS AND DISCUSSION

Table 3: Comparison of Sections

	Open	Tubular	PEB
Weight of 10truss with column (MT)	14.362	9.018	11.038
Rate of truss (Rs.)	1196534.96	751318.072	919609.104

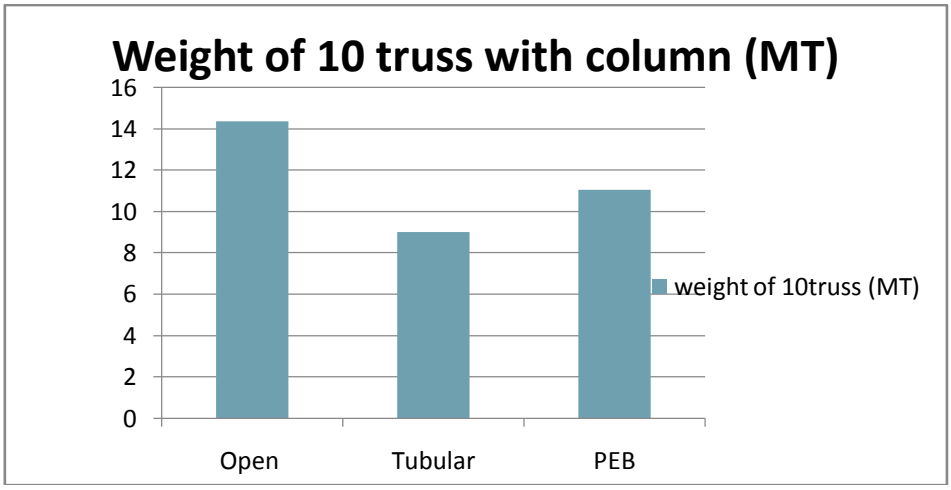

Fig. 1.Weight comparison between sections

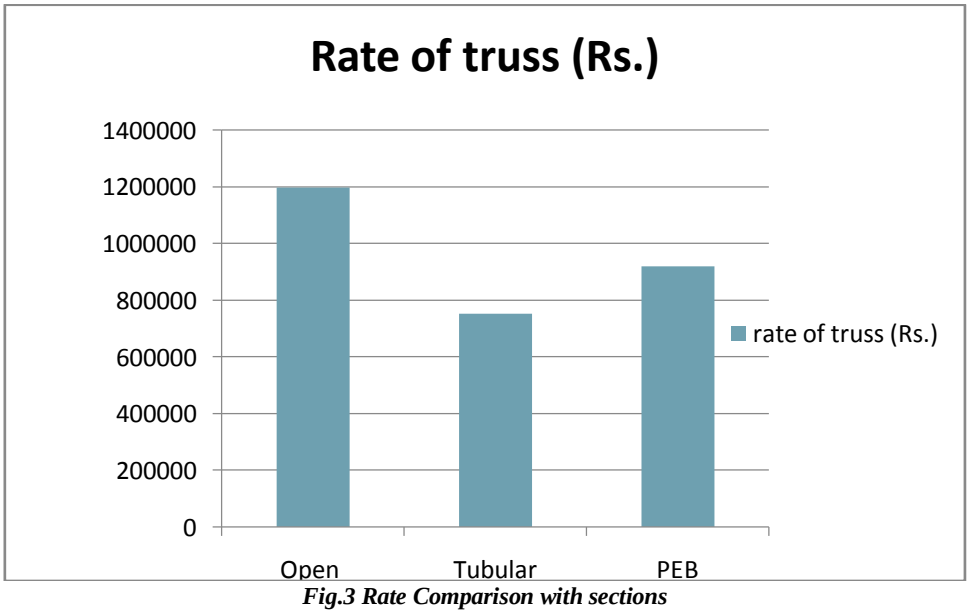

Fig.3 Rate Comparison with sections

CONCLUSION

From analysis and design, it is proved that steel requirement for erecting steel structure using hollow section is very low as compared to structure constructed using conventional section. Though, the cost of erection of hollow section is more than conventional section, material requirement is tremendously reduced in structure

using hollow section.Hollow sections have excellent mechanical, geometrical, tensile, compressive and bending characteristics for exposed conditions and aggressive environments. Thus from estimation, we came on conclusion that cost of erection and manufacturing in case of hollow section is reduced by half of that of conventional section. The pre-engineering building has cost and time of erection is minimized as compare to conventional and hollow sections. It was found that there is saving of 35 to 50 % in tubular sections and 35 to 45% in PEB in steel work and saving of cost in open sections and tubular sections is 30 to 50% and open sections and PEB 20 to 30%.

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