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"ANALYSIS AND DESIGN OF PRE ENGINEERED BUILDING FOR INDUSTRIAL SHED IN CHAKAN"

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Abstract - *Long Span, Column free structures square measure the foremost essential in any sort of industrial structures and Pre designed Buildings (PEB) fulfills this demand at the side of reduced time and value as compared to standard structures. The Pre-engineered steel building system construction has nice blessings to the one level buildings, sensible and economical various to standard buildings, the System representing one central model inside multiple disciplines. Long Span, Column free structures square measure the foremost essential in any sort of industrial structures and Pre designed Buildings (PEB) fulfils this demand at the side of reduced time and value as compared to standard structures. this work involves the analysis and style of Pre designed Buildings (PEB) that is found in chakan. during this work Drawing done by Autocad package, Analysis is completed by Staad-pro package & particularisation done by Bo-cad package.*

***Key Words*: pre-engineered building, Autocad ,Staad pro, Bo-cad Loads – DL,LL,WL**

1. INTRODUCTION

Steel industry is growing quickly in the majority components of the planet. the employment of steel structures isn't solely economical however additionally Eco-friendly at the time once there's a threat of world warming. Here, "economical" word is expressed considering time and value. nonce the foremost vital side, steel structures (Pre-fabricated) square measure in-built a awfully short amount and one such example is Pre designed Buildings (PEB). Pre-engineered buildings square measure nothing however steel buildings during which excess steel is avoided by tapering the sections as per the bending moment's demand. One might imagine concerning its risk, however it's a reality many of us don't seem to be privy to Pre designed Buildings. If we tend to select regular steel structures, time-frame are going to be additional, and additionally value are going to be additional, and each along i.e. time and value, makes it uneconomical. therefore in pre-engineered buildings, the full style is completed within the industrial plant, and as per the planning, members square measure pre-fabricated and so transported to the positioning wherever they're erected in an exceedingly time but half-dozen to eight weeks. The structural performance of those buildings is well understood and, for the foremost half, adequate code provisions square measure presently in situ to make sure satisfactory behaviour in high winds. Steel structures even have far better strength-to-weight ratios than RCC and that they can also be simply destroyed. Pre designed Buildings have fast connections and thence may be reused when dismantlement. Thus, pre designed buildings will be shifted and/or swollen as per the necessities in future. during this paper we are going to PEB structure which is located at CHAKAN. Design & analysis of structure is completed by varied softwares.

1.1 The components of Industrial Building are listed below.

1) Purlins
2) Sag rods
3) Principal Rafters
4) Roof Truss
5) Gantry Girders
6) Bracket
7) Column and Column base
8) Bracings

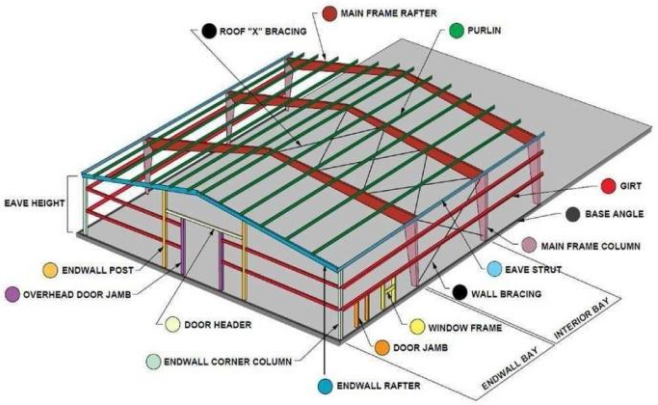


Fig: varied element of industrial building

2. OBJECTIVE:

1. an endeavor is formed to style & analyze the structure & to seek out the steel consumption by the structure.
2. to seek out producing method of project.
3. Theoretical style the section consistent with the input condition.
4. style section supported the soft in step with loading condition.
5. designed of model.
6. Check the standard of structure, stability, improvement, reliableness, cost of material of PEB for below structure.
7. Optimise the steel consumption in PEB structure with structure parameters as per below table.

Structure Parameters

Sr.No.	DESCRIPTION	DETAILS
1	LOCATION OF STRUCTURE	Chakan
2	TYPE OF BUILDING	Clear span (monoslope)
3	WIDTH	3.58 m O/O of steel line
4	LENGTH	10.76 m O/O of steel line
5	HEIGHT	2 M clear height
6	ROOF SLOPE	1:10
7	WIDTH MODULE	1@ 3.58m
8	BAY SPACING	2@ 5.115m C/C
9	FUTURE EXPANSION	No Expandable
10	ENDWALL BAY SPACING	1@3.58m
11	BRACING	Cross Rod Bracing For Roof & Wall
12	WALL CONDITION	1.0 M Open & Above Sheeting
13	STEEL GRADE	FY =345 Mpa

3. DESIGN

3.1SECTION PROPERTIES

Sr.no	Section	Area (cm^2)	Iyy (cm^4)	Izz (cm^4)	J (cm^4)	Material
1	Taper	28.00	337.708	2.24X103	2.993	STEEL
2	200ZS60X1.6	5.698	52.984	352.454	0.00	STEEL
3	Taper	30.500	337.760	3.79X103	3.202	STEEL
4	Taper	26.750	337.682	1.74X103	2.889	STEEL
5	Cir 0.02	3.142	0.785	0.785	1.571	STEEL

3.2 LOAD CALCULATIONS

1)Dead Load

Dead load is calculated According to IS: 875 (Part 1) – 1987.
Dead Load on Pre-Engineered Building:
Weight of the G.I sheeting = 0.129 kN/m2 Weight of fixings = 0.024 kN/m2
Weight of services = 0.1 kN/m2 Total weight is = 0.256 kN/m2
Total weight on purlins = 0.256 x 1.26 = 0.322 kN/m

2) Live Load

The load is calculated in step with IS: 875 (Part 2) –1987.
Live load on purlins = 0.75 kN/m2
Therefore live load on purlins at 1.5 spacing
= 0.75 × 1.5 = 1.125 kN/m

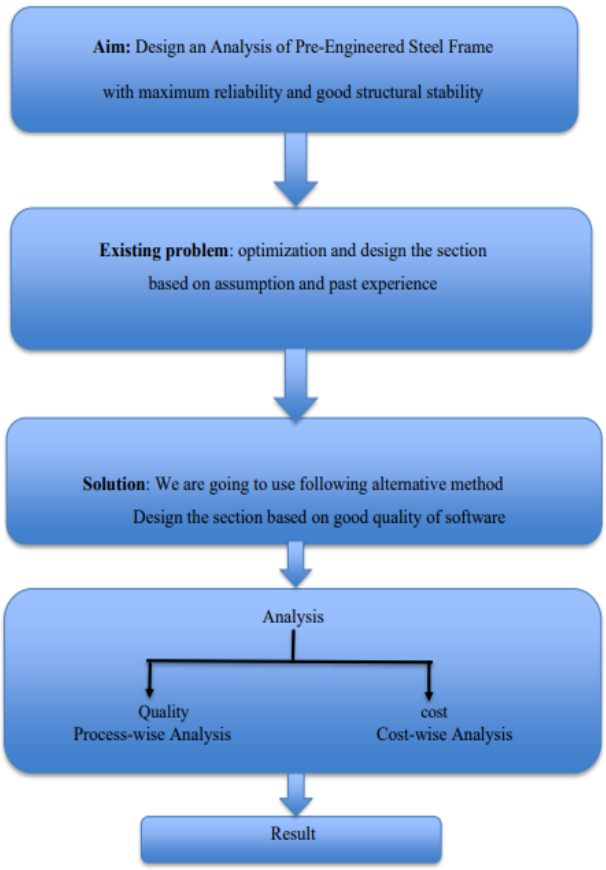
3) Earthquake Load

Earthquake Masses are unit calculated as per IS: 1893-2000 [17].
Earthquake Load on Pre-Engineered Building:
Dead load = 0.1 kN/m2
Live load = 0.43 kN/m2 (25% of reduction as per is 1893-2002
Total load = 0.53 kN/m2
Bay width of the building is 3.85 m
Therefore earthquake load on rafter = 0.53 × 3.85 = 2.0 kN/m.

4) Wind Load

Wind load is calculated as per IS: 875 (Part 3) – 1987
Basic Wind speed Vb = 39 m/sec
Risk Coefficient K1 = 1
Terrain, Height and Structure size factor K2 = 1
Topography factor K3 = 1
Design Wind Speed Vz = VbK1K2K3 = 39 m/sec
Design Wind Pressure P = 0.06 Vz2 = 1.5 kN/m2
The Internal Coefficients are taken as +0.5 and -0.5. Wind Load on individual members are then calculated by
F = (Cpe – Cpi) x A x P
Where, Cpe – External Coefficient
Cpi – Internal Coefficient
A – Area in m2
P – Design Wind Pressure in kN/m2

4. METHODOLOGY



5. DRAWING FOR GA BY AUTO-CAD

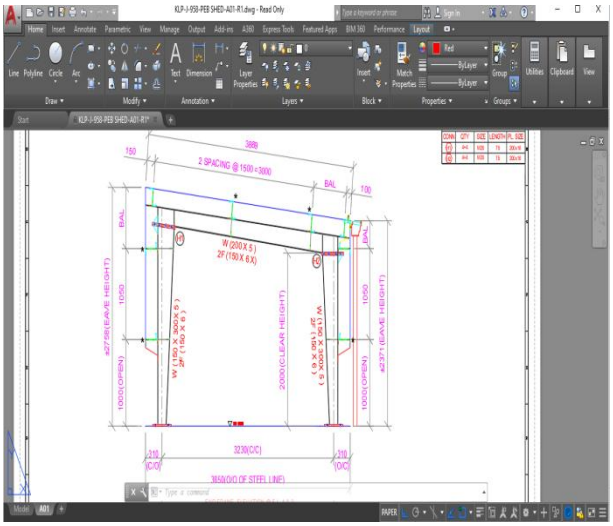


Fig .frame drawing

5.1 MODELLING & ANALYSIS BY STAAD PRO

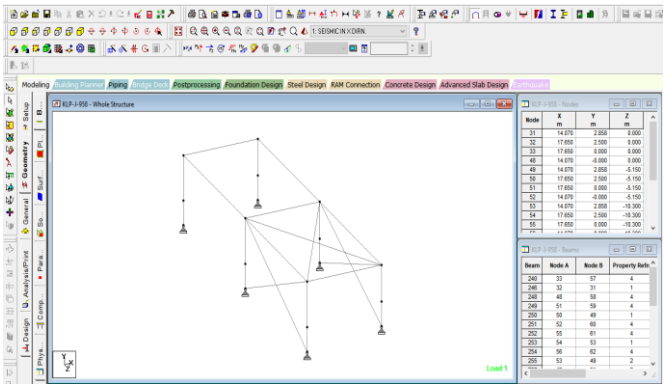
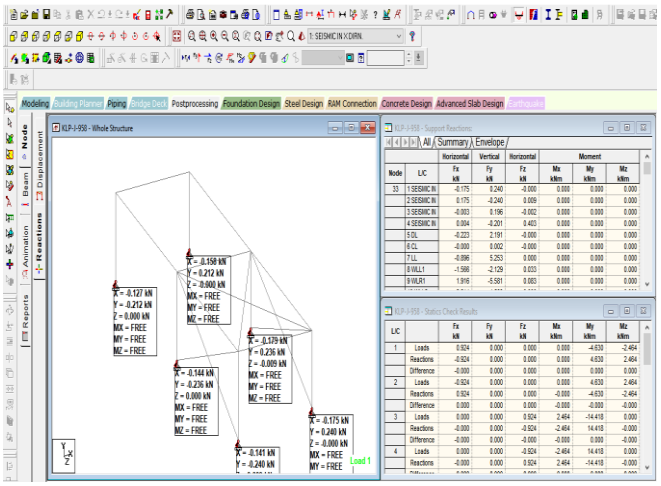


Fig. structure model

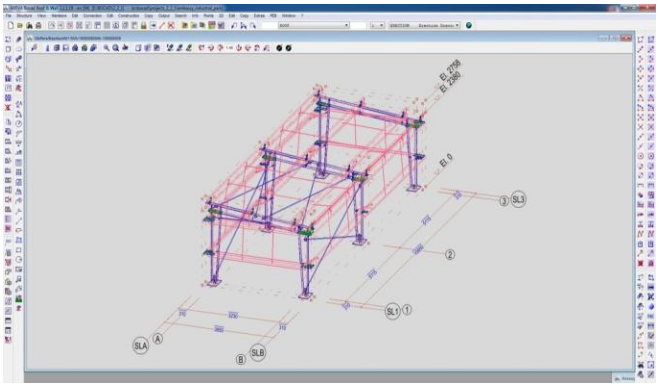
fig. render view

5.2 RESULTS BY STAAD PRO

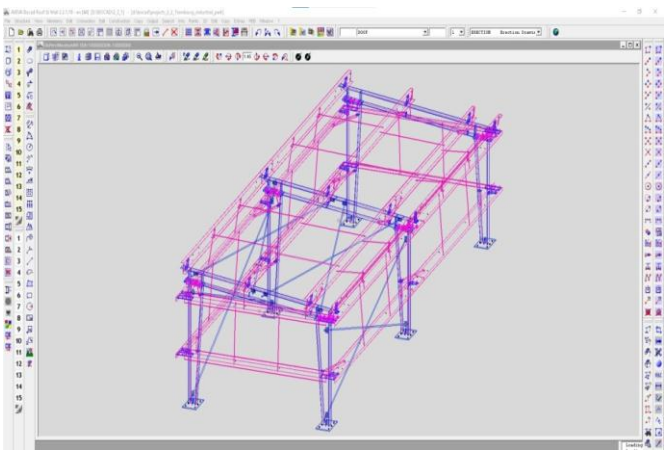


	Max	Min
Fx (KN) Horizontal	3.057	-3.345
Fy (KN) Vertical	7.646	-6.747
Fz (KN) Horizontal	0.512	-0.517
Mx (KNm)	0.000	0.000
My (KNm)	0.000	0.000
Mz (KNm)	0.000	0.000

5.3 DETAILING BY BO-CAD



5.4 FINAL OUTPUT FROM BO-CAD



pre-engineered building creates and maintains in real time flat, information wealthy views through a project support is presently being enforced by Bo-cad computer code packages for particularisation

6. CONCLUSION

QUANTITY OF STEEL USED FOR THE STRUCTURE

Description	Weight in kg	Remarks
Primary Steel	925	All Built-up Members
Mezzanine Beam	0	Including mezz. main beams, Joist & columns.
Crane Beam	0	including crane beam,cap angle & connections
Walkways & Staircase	0	
Anchor Bolts & Templates	300	
Secondary Steel	675	Including Coldformed members & Flange bracings
Hot Rolled Members	0	Pipes & tubes
Roof Sheeting	182	0.47MM thick Bare galvalume panel
Roof / Wall Accessories	99	Including All trims,gutters & Downspouts
Wall Cladding	356	0.50MM thick Color Coated panel
Rod bracing + Sag rod	219	
Grand Total	**2755.42**	**Kgs**

NUT BOLT USED

Qty	Designation	Strength	Weight kg	Total Wt.kg
36	M12*35	A325	0.07	2.52
1	M12*35	A325	0.04	0.04
1	NUT12	A325	0.02	0.02
2	WASHER12	A325	0.01	0.02
208	M12*45	A325	0.08	16.64
1	M12*45	A325	0.05	0.05
1	NUT12	A325	0.02	0.02
2	WASHER12	A325	0.01	0.02
48	M20*75	A325	0.33	15.84
1	M20*75	A325	0.23	0.23
1	NUT20	A325	0.06	0.06
2	WASHER20	A325	0.04	0.08
TOTAL 35.58				

It means that choosing reliable industrial product that square measure on the market during a massive vary of shapes and colours; it to boot implies that speedy web site installation and fewer energy consumption. It implies that choosing to commit to the principles of property. Infinitely utile, steel is that the fabric that reflects the imperatives of property development.

ON SITE PHOTO

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