ABSTRACT
Steel is the eco friendly material with recyclable behavior. In current scenario increase the importance earthquake resistant buildings with advanced construction Techniques with innovative materials. Compared to concrete structures steel structures resists maximum loading. Also steel structures are easy to construct and has increased design life of structures. It is easy to fabricate durable structure. For check its resistance and load bearing capacity using STAAD Pro with seismic analysis. In this paper considers the Industrial building warehouse with 5400 Sq.m total area analyze the building using STAAD Pro. Results and steel member design also discussed.

Keywords: Eco friendly, Earthquake, Load Bearing Capacity And STAAD Pro

1. INTRODUCTION
Structural members are used for heavy structures like warehouse, Factories etc, with standardized shape of chemical composition and strength. They can also be defined as hot rolled products, with a cross section of special forms like angles, channels and beams/joists. In India consumption steel for construction Industry will be increased since its better tension and compression resistance capability compared to concrete. Generally steel structures consists 3 dimensional trusses for stability. Aesthetical aspect of structure increased due to its minimum number of partitions, walls and columns etc. Most of these homes might also require good enough head room for using an overhead travelling crane. Today, flexibility and ductility are the key issues. Manufacturing or petrochemical industries expanse across acres of land, however they're normally single or double storied systems. Structural metallic is the maximum generally used fabric to design and construct business systems.

1.1 Industrial Sheds
Relying on the necessities, commercial sheds can be both small or huge. They can be used for numerous purposes inclusive of to technique, design, keep or distribute substances. Fabricating such metal structures requires knowledge in steel fabrication so as to assemble structural steel sheds of the proper dimensions and different capabilities as in step with the necessities.

2. BUILDING PLAN
Figure 1 shows the Flooring Layout.
Figure 1 Flooring layout

Figure 2 shows the Elevation of Industrial Building.

3. STRUCTURAL DESIGN

3.1 Design Data

Overall length of truss = 40 m
Overall width = 15 m
Width of c/c of roof truss = 15.5 m
C/c spacing of roof truss = 8 m
Height of column = 9 m
Roofing material = Asbestos cement sheet

Let us assume the life of the building to be 100 years and the land to be plain

\[ k_1 = 1.05 \]
\[ k_2 = 0.89 \text{ (for terrain category 3, building height = 11 m)} \]
\[ k_3 = 1.0 \text{ (for plain land)} \]
\[ v_b = 50 \text{ m/s} \]

Design wind speed, \[ v_d = k_1 x k_2 x k_3 x v_b = 1.05 x 0.89 x 1.0 x 50 = 46.72 \text{ m/s} \]

Design wind pressure, \[ P_d = 0.6 x v_d^2 = 0.6 x 46.722 = 1309.6 \text{ N/m}^2 \]
\[ = 1.309 \text{kN/ m}^2 \]

3.1.1 Purlins

Prior to the design of purlins it is necessary to decide the spacing of the columns so that the spacing of the truss is fixed. Let us provide columns 8 m c/c and fix the geometry of the roof truss so that the spacing of the columns can be fixed.

Let us assume the rise of the truss = 2 m.
Let the inclination of roof with horizontal = 0.
Length of rafter, $LoU4 = \tan^{-1}(27.5) = 14.55'$

Distance between panel points of the top chords of roof truss,

$LoU1 = U1U2 = 7.762 = 3.88 \text{ m}$

The panel length in plan

$= 3.88 \times \cos 14.931 = 3.74 \text{ m}$

Let us place the purlins at the panel joints.

4. ANALYSIS REPORT

4.1 Section Properties

Table 1 shows the Section Properties.

<table>
<thead>
<tr>
<th>Prop</th>
<th>Section</th>
<th>Area (cm$^2$)</th>
<th>Iyy (cm$^4$)</th>
<th>Izz (cm$^4$)</th>
<th>J (cm$^4$)</th>
<th>Material</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>ISHB400</td>
<td>98.70</td>
<td>2.73E 3</td>
<td>28.1E 3</td>
<td>43.549</td>
<td>STEEL</td>
</tr>
<tr>
<td>2</td>
<td>ISA80x80x8</td>
<td>12.20</td>
<td>117.17</td>
<td>30.286</td>
<td>2.662</td>
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</tr>
<tr>
<td>3</td>
<td>ISA120X120X1</td>
<td>23.30</td>
<td>504.59</td>
<td>132.54</td>
<td>7.833</td>
<td>STEEL</td>
</tr>
</tbody>
</table>

4.2 Beam End Force Summary

Table 2 shows the Beam End Force Summary.

<table>
<thead>
<tr>
<th>Beam</th>
<th>Node</th>
<th>Axial</th>
<th>Shear</th>
<th>Torsion</th>
<th>Bending</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>$F_x$ (kN)</td>
<td>$F_y$ (kN)</td>
<td>$M_y$ (kN/m)</td>
<td>$M_z$ (kN/m)</td>
</tr>
<tr>
<td>Max Fx 69 21 LOAD</td>
<td>146.752</td>
<td>-1.224</td>
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<td>-0.000</td>
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<tr>
<td>Min Fx 46 18 LOAD</td>
<td>-114.711</td>
<td>0.400</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
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<tr>
<td>Max Fy 10 1 LOAD</td>
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<td>346.284</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
</tr>
<tr>
<td>Min Fy 19 5 LOAD</td>
<td>4.616</td>
<td>-346.284</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
</tr>
<tr>
<td>Max Mz 1 1 LOAD</td>
<td>0.000</td>
<td>2.843</td>
<td>0</td>
<td>0.000</td>
<td>0.000</td>
</tr>
<tr>
<td>Min Mz 1 1 LOAD</td>
<td>0.000</td>
<td>2.843</td>
<td>0.000</td>
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<td>0.000</td>
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<tr>
<td>Max My 1 1 LOAD</td>
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</table>

Figure 3 shows the 2D view – Industrial Structure.
5. CONCLUSION

Any building used by the enterprise to house the manufacturing activity, stock raw substances, inventory completed product before supply is known as an commercial constructing. Structural metallic is a commonplace building material used for the duration of the construction industry. Its primary reason is to shape a skeleton for the shape, basically a part of the shape that holds the whole lot up and collectively. As in step with the requirement of a commercial building, the correct kind of roof truss and the portal body is utilized. A roof truss is designed for self weight, lateral loads and their combos as consistent with Indian requirements in Staad software program. The guide layout of different components also are given excessive significance and calculations of desired reinforcement is found with high elements of protection.

References


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