

COMPRUTERIZED DESIGN
OF
A STEEL BUILDING

BY

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Project Report

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INTRODUCTION

As the time goes by steel construction becomes a more frequently use for large buildings or projects . A steel frame structure consist of a skeletal framework which carries all the loads which the structure is subjected to and its task is to transfer those loads safely to the foundations .

Steel has several advantages instead of concrete . These are :

- A steel structure can be finished earlier than a concrete one.
- A steel structure costs less than the concrete one
- A steel member can be loaded more than a concrete one of about the same section e.g a skyscraper can not be made of concrete because of the big loads and the concrete can not resist and withstand it.

One disadvantage of steel is that steel has less fire resistance than concrete.

The general idea of a steel structure is that all the loads are transferred from the floors to the floor beams and from there to the girders . From the girders the loads are transferred to the columns . Loads are pass down from all the floor of the structures via the columns and finally are transmitted to the foundations and the soil.

STRUCTURAL ELEMENTS :

Steel buildings are composed of distinct elements :

- Beams and girders (carrying lateral loads in bending and shear)
- Ties (carrying axial loads in tension)
- Struts , columns , stanchions (carrying axial loads in compression)
- Trusses (carrying lateral loads , composed of struts and ties)
- Purlins (carrying roof sheeting)
- Sheeting rails (supporting wall cladding)
- Bracing (resist wind and building)
- Bases (transit the loads from the columns to the foundations)

For the designing of steel structures a steel design code was created (code we use is BS5950). When we refer to the term design we mean the selection of the proper section size to have the needed moment and shear capacity . After the proper connections are needed to be selected .

For terms of safety the sections used must have higher capacity from what is actually required .

All the steel members are produced and fabricated beforehand in standard size and sections thus the designer has to choose from those standardized steel members .

In our days various computer programs were created for the purpose of assisting the engineer to design and create clearer design documents . This project is concerned with the design of a steel building using computer program STAAD Pro 2005 .

Briefly Informations about steel :

Steel has a carbon content ranging from .2 to 1.5 percent, enough carbon to make it harder than wrought iron, but not so much as to make it as brittle as cast iron. Its hardness combined with its flexibility and tensile strength make steel far more useful than either type of iron: it is more durable and holds a sharp edge better than the softer wrought iron, but it resists shock and tension better than the more brittle cast iron. However, until the mid 1800s, steel was difficult to manufacture and expensive. Prior to the invention of the Bessemer converter (described below), steel was made mainly by the so-called cementation process. Bars of wrought iron would be packed in powdered charcoal, layer upon layer, in tightly covered stone boxes and heated. After several days of heating, the wrought iron bars would absorb carbon; to distribute the carbon more evenly, the metal would be broken up, rebundled with charcoal powder, and reheated. The resulting blister steel would then be heated again and brought under a forge hammer to give it a more consistent texture. In the 1740s, the English clockmaker Benjamin Huntsman, searching for a higher-quality steel for making clock springs, discovered that blister steel could be melted in clay crucibles and further refined by the addition of a special flux that removed fine particles of slag that the cementation process could not remove. This was called crucible steel; it was of a high quality, but expensive.



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