
Chapter 1

Introduction And Scope Of Search

1.1/ Introduction:

Steel is one of the most important and efficient material for structural purposes. The use of steel became more widespread during World War II and significantly expanded after the war when steel became more available. Steel structures have been widely accepted, in part due to cost efficiency. The range of application has expanded with improved materials, products and design capabilities with the availability of computer aided design software. Steel provides several advantages over other building materials, it is a "green" product and structurally sound and manufactured to strict specifications and tolerances. Any excess material is 100% recyclable and it does not warp, buckle, twist or bend, and is therefore easy to modify and offers design flexibility. Steel is also easy to install. it is allows for improved quality of construction and less maintenance, while offering improved safety and resistance. Steel has a good strength both in tension and compression (250 N/mm^2 up to about 2000 N/mm^2), and also low strength to weight ratio. Steel can be made to a wide range of strength it generally behaves as an elastic material with a high (and relatively constant) value of the elastic modulus up to the yield or proof strength. It also usually has a high capacity for accepting plastic deformation beyond the yield strength, which is valuable for drawing and forming of different products, as well as for general ductility in structural applications. Product forms range from thin sheet material, through optimized structural sections and plates, to heavy forgings and casting of intricate shape. , the material is normally ductile with good fracture toughness for most practical applications. Members are made by hot rolled and cold formed sections ,they are product as (I) section ,(H) section , Channels, Equal and unequal angles, Structural tees, Circular, square and

rectangular hollow sections. Compound sections are formed by strengthening a rolled section by welding on cover plates, Combining two separate rolled sections and connecting two members together to form a strong combined member. Built-up sections are made by welding plates together to form I, H or box members which are termed plate girders, built-up columns, box girders or columns.

Structural steel systems consist of a rigid frame and triangulated frame which carries all the loads to which the building is subjected. The behavior of a structural frame depends on its arrangement and loading, and on the type of connections used. Triangulated frames with joint loading only have no primary bending actions, and the members act in simple axial tension or compression. The behavior and design of these members like tension members and compression members. Rigid frames include rectangular frames which may be multi-storey, or multi-bay, or both, and pitched-roof portal frames. The members usually have substantial bending actions. Structural steel systems are composed of distinct elements such as Beams, Ties, Struts, columns or stanchions, Sheeting rails, purlins and base plate.

This research deals with behavior and design of steel structural systems. The study is restricted to the following types:

Portal frame, trusses and bracing systems, plate girder and composite systems.

1.2/ Project Significance:

Steel structures have been widely accepted in many buildings, specially in tall and long span buildings and bridges, this project studies the properties and behavior of the structural steel, and the optimal use of it in

lesser expenses, it also studies how to find solutions to the problems that confront us.

1.3/ Project Objectives:

This study aims to acknowledge the behavior and design of some structural systems and their uses in a technical and structural way.

1.4/ Project Methodology:

The study of the physical and mechanical properties of the structural steel, the knowledge of the types of produced sections, the study of the steel structural design under the influence of shear, bending and compression, a comparison between some steel structural systems on the expenses side. The organizational structure for scope of the search:

Chapter (1): This chapter include a general introduction to the subject of the study , the importance of research, research objectives and the research methodology.

Chapter (2): This chapter deals with material, mechanical properties, steel products ,steel design Philosophy and design of steel member.

Chapter (3): This chapter deals with structural behavior and design of steel structural systems. The study is restricted to the following types Portal frame, trusses and bracing system , plate girder and campsite systems.

Chapter (4): This chapter deals with analysis and design applications for truss portal types of structural systems of steelwork using BS-5950-1:2000

Chapter (5): This chapter deals with conclusions and recommendations.