CHAPTER 1

INTRODUCTION

1.1 Background of Study

The construction industries has going through many changes and development towards the better and more advanced structures. Steel is one of the material of construction and is a basic ingredient needed in construction. In steel structures, there are two types of structural steel members that are hot-rolled steel members and cold-formed steel members. The hot-rolled steel members always being a popular choice of steel group and are widely used in construction industry but because of the several advantages of cold-formed over the hot-rolled steel sections, the use of cold-formed high strength steel structural members shown a rapid increase. Cold-formed steel structural members are commonly provided with holes to accommodate electrical and plumbing of building.

1.2 What is Cold-formed

Cold-formed steel members as shown in Figure 1.1 is formed in room temperature state and the steel product is formed by a steel strip or sheet of uniform thickness that combined together to formed a structure. The use of cold-formed steel section in others country can be found in rail transport, building and bridge construction and various type of equipment. In Malaysia, the common used of cold-formed steels are limited to a roof truss and framing. In construction industry, the cold-formed steel is being used in both non-structural and structural members. As non-structural members, the advantages are more on resistance to the rust because of the coating and aesthetic purposes because cold-formed can be coloured and design according to the interest. It is used as non-structural member for door and window farming, wall panelling and services. As structural members, the usage can be used as a truss members, beams, columns, and floor decking in steel concrete construction.
Cold-formed steel products are shaped from steel sheet, strip plate or flat bars by cold rolling-forming method or press braking method. They can be produced in large quantity in a limited time consumption and at high speed with consistent quality. The thickness of material formed together usually range in general between 0.70 mm to 3.5 mm. The critical elastic buckling loads are associated with local, distortional, and global buckling. Unlike heavy hot-rolled steel sections, cold-formed thin-walled sections tend to buckle locally at stress levels lower than the yield strength of the material when they are subjected to various loading conditions. However, failure modes are not commonly encountered in normal structural steel design specifications, and therefore, extensive testing is required to provide a guideline for the design of cold-formed thin-walled structural members.

![Example of cold-formed steel](image)

**Figure 1.1** Example of cold-formed steel

Opening in cold-formed steel sections made specifically for fasteners such as bolts, screws, etc., may be neglected as openings are filled with material. However, for any other openings, the reduction in cross sectional area caused by these openings should be taken into account. The ultimate strength and elastic stiffness of a structural member can vary with opening position, size, shape and orientation. In evaluation of the section properties of members in compression, openings need to be considered. The perforations can be divided by pre-punched or punched-on-site but mostly pre-punched are more favourable due to the problem that will rise later if the hole are not accurately made.
1.2.1 Example of Usage of Cold-formed Steel

Figure 1.2 House made up from cold-formed steel

Figure 1.3 Cold-formed steel framing