

CHAPTER 1

INTRODUCTION

1.1 Introduction

Basically, every construction industry use different types of structure such as concrete, steel, wood, glass according to the requirement of the design because every structure have their own special benefits. Cold-formed steel structures is one of steel structure that also used in industry including building structures, transportation machineries, storage racks, domestic equipment, and others. Cold-formed steel is made up from thin steel sheets or strip material. Compared to other structures, cold-formed steel have its own advantages on having a good strength of material, high durability, non-combustibility, high sustainability, and cost-effectiveness than other materials. Cold-formed steel exist in different conditions which are with various shape, sizes, perforation position, and orientation that will result in different ultimate strength and buckling behaviour. The example of structure using the applications of cold-formed are shown in Figure 1.1 and Figure 1.2 .



Figure 1.1: Roof truss using cold-formed steel



Figure 1.2: Residential area using cold-formed steel

The manufacturing process involves to form the material are press-braking and cold roll-forming that can developed the steel into required shape at a low temperature. Press-braking is done using bending method by clamping the work piece between a matching punch and die. Typically, press-braking is more efficient and cost-effective compared to other method. However, it only suitable for small volume with shorter length. It is easier to set up, save the time of manufactured and normally less expensive than cold roll-forming. For cold roll-forming, the process uses a series of rolls that work the metal until it has been precisely into the desired shape. When the design is complex, more rolls will be used where sheets of steel will fed through the rolls. Roll-forming cost is higher than other services but it is suitable to handle for high volume. It allows lower labour cost and easily form high-strength steels while accomodating for spring back. These processes increase the yield strength and tensile strength but at the same time decrease the ductility of cold-formed steel sections particularly at the corners where these properties can be considerably different from those of flat steel sheet, plate, and strip or bar before forming (Wei Wen Yu, 2000). Figures 1.3 and 1.4 show the process of cold-formed steel section done by press-braking and roll-forming respectively.



Figure 1.3: Press-braking process



Figure 1.4: Roll-forming process

The presence of perforations always create a problems to cold-formed steel section members. This is because the strength of cold-formed steel will decreased when the diameter of the hole increased. The strength of cold-formed on perforations also depends on the shape of the perforations. However, presence of perforations in cold-formed is important in terms of accommodating electrical, plumbing, and heating services in the walls and ceilings of buildings. Thus, if it will become the problem we need to provide a better suggestion to overcome this matter.