



DESIGN AND ANALYSIS OF A DOUBLE GUIDED ROLLER FOR A JIGSAW

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ABSTRACT

Jigsaw machines are common cutting tools and used in a large scale in wood working industries. The main problem with jigsaw usage is imprecision cutting due to blade deflection and human handling method. In this paper, a new design of second guided roller for the jigsaw to avoid blade deflection is introduced. A steel arm which holding the second guided roller and a platform with a guided fence are also presented. The cutting finding with and without using this tool is compared and reported. It is found that the jigsaw paired with this tool is able to cut a better straight line with a smooth cutting surface.

Keywords: blade deflection, precision cut, jigsaw, double guided roller.

1. INTRODUCTION

A jigsaw is a handy and low cost cutting machine used by most carpenters worldwide. A jigsaw can do variety of tasks and could cut everything from wood to cardboard and from aluminum to alloys by changing a proper blade suit to its task. Usually, it is used for a small cutting project such as to cut a thin layer of a wooden plank. The cutting operation is done manually by moving the jigsaw on wooden plank in any desired direction. For this purpose, a very skilled labor is required for cutting preferred profile especially for a long straight line. Even though a skillful operator is used, it is very difficult to get a precise straight cutting line. Another disadvantage of using the jigsaw is that the blade deflects when cutting a hard or thick wooden plank. As a result, an uneven surface of the edge of the cutting wooden plank is obtained. Hence the aim of this project is to reduce the uneven cutting edge problem by introducing a second guided roller for the jigsaw blade. The report also includes the setup of the jigsaw table with adjustable fence in order to get a straight line cut.

Actually there are many types of cutting machine that can perform a long straight line cut with precise and even edge such as table saw and circular saw. However this kind of cutting machine will cost more as compared to jigsaw. Even though circular saw is not too expensive relative to jigsaw, it has its own drawback. Circular saw cannot perform curvy cut. Therefore a jigsaw is still relevant and to avoid uneven edge cutting, the new technique is introduced and described in this report.

2. METHODOLOGY

In this paper, a comparison of between before and after using this new method is reported. This is a common method and has been previously reported for other types of cutting machine [1-2]. The cutting speed of the jigsaw is set at the same rate by setting up the control lever as shown in Figure-1.

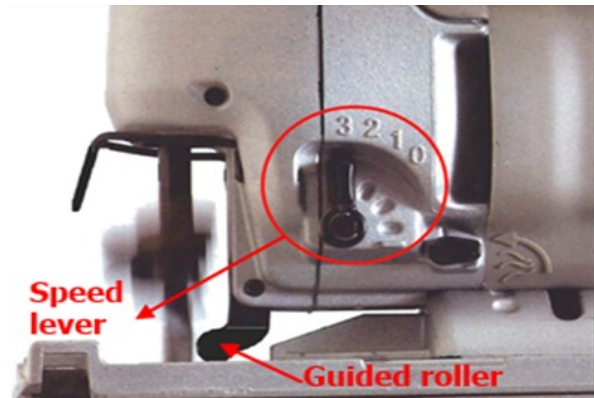


Figure-1. Speed lever and guided roller on a jigsaw.

This is important because the cutting efficiency of a jigsaw machine depends on cutting speed and feeding ratio [3]. However, the feeding ratio is assumed to be at the same rate because a human operator controls the machine. The type of jigsaw blade is also retained in this comparison because a different blade can produce different cutting quality [4]. Another main factor which can contribute to the finishing quality is the hardness of the wood used [5]. In this report the same type of wood is used for cutting purpose. In order to analyze the finishing quality easier, the cutting direction with respect to the wood line must be retained. According to J. Kovac et al [6], there are many other parameters that affect cutting power such as cutting angle, blade width, number of blade tooth, etc. All these parameters will affect the feeding ratio and yield a different finishing quality. As mentioned earlier, the feeding ratio is assumed to be at the same rate because human operates the jigsaw.

3. SETUP

The development of the cutting machine consists of two main sections. The first section is a second guided roller for the cutting blade attached to a steel arm as shown in Figure-2. The guided roller can be placed at any