

Review Paper on Stirrup Making Machine

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Abstract - As presently rod bending and stirrups making operations are one of the essential operations in the construction industry. In construction sites & workshops usage of machines, whether it is manual, semiautomatic or fully automatic has become common for bar bending and stirrups making. In this research paper, a review of available methods & machines used for bending and stirrups making is presented.

Key Words: Stirrup, Pneumatic Bending Machine, Automation, Stirrup making

1. INTRODUCTION

The demand of construction industry is increasing for the construction of bridges, buildings and human living places. Stirrups and bars play an essential role in the construction industry in the formation of reinforcement structure also called as shear reinforcement. Reinforcement safeguards any structure against failure caused by diagonal tension. Bar bending operations are carried in different ways i.e. using hydraulic, pneumatic, electric motor and manually applied force. Each of this type has different processes for bending the bars. Here bars of 6mm, 8mm, and 10mm diameter are used to make stirrups or to make bends. The machines were designed in order to reduce human efforts with the least cost. Another attempt is made to increase productivity by reducing human labor.

2. LITERATURE REVIEW

2.1 DESIGN AND FABRICATION OF MULTIROD BENDING MACHINE

In this paper, the need for reducing the lead time of stirrup making operations is described in order to uplift the rate of production. By considering this as the need, Anbumeenakshi et al. [1] designed a mechanized hydraulic bending machine which is capable to produce more than one stirrup at a time. The machine utilizes hydraulic power which is safe as well as easy to control. The machine consists of steel frame and hydraulic reservoir at the bottom. The bending mechanism in the top section of the frame includes a base plate which is fixed and provides a base for index plate. Index plate having a curved profile with four cuts guides the index cylinder for making the die ready for next bend. The guide plate is mounted above index plate which performs the function of providing the right profile to the stirrups. By varying the size and shape of guide plate it is possible to produce different

types of stirrups. Two hydraulic cylinders are used; one is termed as Bending cylinder and another one as Index cylinder as per their functions. Bending cylinder is completely fixed to the frame, whereas Index cylinder is connected such as way that, it can oscillate on one of the ends. A pivot joint is used, which allows the cylinder to have some angular movement up to few degrees. A hydraulic power pack is placed just above the hydraulic reservoir which contains a motor, safety valve, control valve, strainer etc. [1]



Fig -2.1: Multirod Bending Machine [1]

As the bending rod is feed around the guide plate and it is clamped with the help of locking key to retain its motion. After a dry run of the hydraulic system, the systems desired pressure operates the bending cylinder. As bending cylinder contain grooved roller on its plunger, it presses the rod between the guide plate and a successive bend is formed. Now as the bending plunger comes back to its initial position, Index plunger is operated as it has a pin which is temporarily attached to indexing plate profile. As the plate turn 90° the pin losses its contact and come back to its initial position. Similarly next bend is performed. After completing four such bends, a complete stirrup is formed. The advantages of this system are, it can handle multiple rods at a time, it is easy to operate and also portable. It is concluded that for 20 stirrups machine requires 15 minutes.

2.2 DESIGN AND FABRICATION OF PNEUMATIC BAR BENDING MACHINE

Thokale et al. [2] realized that since long a time construction works desperately need a large amount of labor work for mixing aggregate-sand-water-cement, digging works for foundations, pouring concrete in beams and columns, cutting and forming stirrup of required length etc. As population

