

Sensor Based Safety System For Table Saw Wood Cutter

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Abstract - The main objective of the study is to develop a safety system of wood cutting electric table saws, Which is based on Infra-Red sensor. The safety devices are very essential devices that should be used in industries or workshops, the danger meets with such type of accident while using wood cutter therefore to reduce the risk of occurrence of the accident or an injury a safety device is required. So we need to develop a safety device to prevent the operator from this type of accident.

Key Words: Injury, accident, IR sensor, disc Brake, safety.

1.INTRODUCTION

The safety devices are very essential devices that should be used in industries or workshops, the danger meets with such type of accident while using wood cutter. In India commonly 12% people yearly meet with these types of accidents due to their common human behaviours like tiredness, laziness, sleepiness etc. The wood cutter generally table saw is a commonly used tool in every workshop & industries. Although there are a variety of models available, all table saws have the same basic design. A flat surface through which a saw blade is attached generally circular in shape. The operator of the saw pushes the item to be cut towards the rapidly spinning blade. The current wood cutter system is not enough to work safely. So there is requirement of wood cutter system. We introducing a wood cutter safety system in which a sensor & disc brake are used to overcome the accident with the wood cutter.

Circular table saw is a machine which causes many accidents are occurred during cutting operation. Hand injury is the main injury in table saw. This type of accidents occur because of adequate amount of safety equipment are not available in saw mill or present technologies are not sufficient to overcome the accidents. Therefore there is requirement an advanced wood cutter safety which can minimize the accidents by wood cutter completely.

2. REQUIREMENTS AGAINST ACCIDENT IN TABLE SAW

2.1 Saw guard

A suitable saw guard should be placed on the table of the table saw wood cutter to overcome the accidents due to contact of saw blade with human limb or hand.

Now a days a blade guards are used on the table saw to eliminate the injuries.

2.2 Braking device

To reduce the risk of contact with the saw blade during cutting operation a braking device should be used. Table saw should be fitted with a braking device that brings the blade to rest within seconds.

2.3 Sharp saw blade

Dull saw blade causes poor work quality. It also increases the operator's effort to feed the work piece which increases the chances of accidents with saw blade.

2.4 Wood dust

Table saw wood cutter should be used a safety device to prevent the sawyer with the dust or chips of wood.

3. RESEARCH METHODOLOGY

The research method for the study include on the spot assessment (Segun R.Bello,2010) for injuries in saw mills industries and manuscript (Kevin C.Chung,2013) for the information about the table saw injuries and the safety devices used now a days.

We have taken a survey on some saw mills, which are at Timber market Raipur Chhattisgarh for the information about the no. of accidents occurred by the wood cutter and which type of safety devices are used in saw mills.

Also we preferred a research paper (P.J. Groot, G.J. Postma) to take the information about the infrared sensor and the International journal (Asim Rashid, Vol.10, No.4, pp.257.301) for some information regarding the disc brake.

4. PARTS WHICH ARE USED IN SAFETY SYSTEM

. There are mainly two parts in the wood cutter safety system.

4.1. Motorized disc brake

4.2. Electronic Infrared sensor

4.1 Motorized disc brake

This is a general disc brake with its actuating mechanism is operated by motor which is further controlled by an automatic controlling circuit. The disc brake we are using in the model is not similar to the actual disc brake due to its

scaled dimensions. Instead of adding disc brake we will make another braking mechanism which will be similar to the disc brake on giving braking effect. We will use this motorized disc brake to apply the brake on shaft of the saw blade.

4.2 Electronic infra-red sensor

IR (Infrared) sensors use infrared light to sense any obstacle in front of them and gauge their distance. The commonly used IR sensor have an emitter and a detector. A pulse of infrared light is emitted from the emitter and spreads out in a large arc. If no any obstacle is detected then the IR light continues forever. However, if any obstacle is nearby then the IR light will be reflected and some of it will hit the detector. The detector is able to detect the angle that the IR light arrived back and thus can determine the distance to the obstacle.



Fig-4.2: Electronic infra-red sensor

5. MODELING OF THE PARTS ON ASSEMBLY

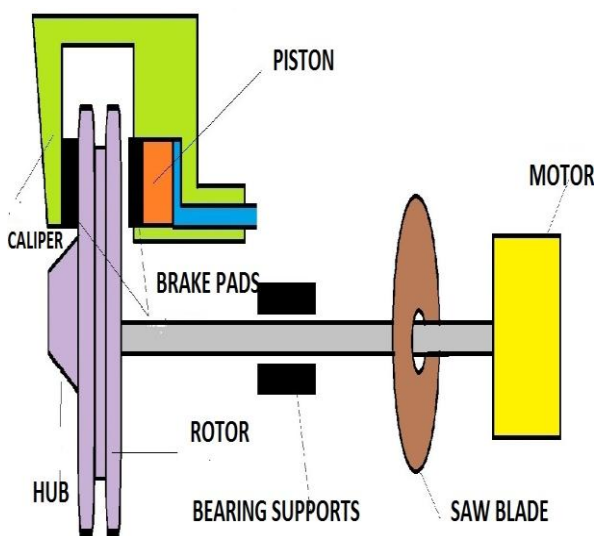


Fig -5: modeling of parts on assembly.

6. WORKING OF THE SYSTEM

- The system works on the quick response method.
- When the cutter is running the sensors are activated when the hand of sawyer's with gloves (generally black) comes very close to the cutter blade, it is sensed by the infrared sensor.
- This sensor signals the controller and controller sends a signal to the disc brake which applies the brake to stop the running blade.
- The motorized disc brake takes very less time for braking.
- The sensitivity of the sensor is lightening fast.
- This makes all the system works quickly in case of accidental contact with blade of cutter.

7. CONCLUSION

- The safety system could become more advanced by adding some mat lab related sensors like cameras and infrared image scanner.
- The safety system will become more accurate and reliable by taking it under observation of the modified computerized system.
- The disc brake can be replaced by another advance brakes in future.
- The system errors could be overcome by using two or more sensors at a time.

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