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Fabrication of Hybrid Band Saw for Multiple Applications

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ABSTRACT

This paper focus on the fabrication and fabrication of a Hybrid Band saw for cutting metal, PVC pipes, meat, and metallic rod to diverse sizes and lengths using both solar and electric power. The main objective of this project is to save manpower, extra effort and time, and energy in cutting metals to achieve high productivity and efficiency. It is a cutting with teeth on its blade used especially for cutting material. The power to the Band saw is provided by Solar Energy and electrical energy. The motor drives the first flywheel (WHEEL) connected to the shaft of the motor with help of a tight clamp for fixed gripping. The second flywheel (WHEEL) is connected through a link that transmits the required force for cutting the workpiece. These wheels are directly connected to the motor, and the Band saw is mounted on both wheels Work piece of the desired length can be cut by feeding it to Band saw by holding it into a bench vice. The various component of the was fabrication and construction. The test was carried out using different metals. A solar panel connected to a power Band saw is considered a solar-operated power Band saw in which the sun's energy is used to drive the Band saw to cut wood, metal rod, etc. Solar connected to the Band saw converts the solar energy into electrical energy which is stored in a 6 V VRLA Battery as a direct current to run the motor connected to the Band saw. A DC motor is connected to the Band saw which is used to give the rotary motion to the flywheel connected to the shaft of the dc motor. The energy stored in the battery is supplied to the dc motor which rotates the flywheel connected to the shaft of the motor. The rotary motion of the wheels Band saw mounted on it; the workpiece which performs the cutting action. The workpiece is clamped in a clamper to fix it. The clamper is made of cast iron or mild steel. A solar power Band saw is a cheap and environmentally friendly device that is operated without the consumption of any energy other than solar energy. Solar energy is cheap and easily available on earth. No heavy s or devices are required for energy conservation. Solar-powered Band saws can be used in a workshop, industries, and many fields where there is a requirement for Band saw.

Keywords:- Hybrid Band Saw, Fabrication, Applications

1. INTRODUCTION

In this document, A Bandsaw is a tool used to cut through materials like plastic tubing and metal pipes. Removable blades provide its cutting mechanism with sharp teeth along its outer edge. A Bandsaw usually consists of a metal frame that resembles a downward-facing. A plastic, wood, or metal is typically affixed to one end of the frame. The frame's ends feature adjustable pegs that can be tightened to secure a blade in place and loosened to remove it. Bandsaw blades are long, thin strips of hardened steel that feature a row of teeth along their cutting edge. Each end of the blade is punched with a small hole that fits onto the saw frame's pegs. Most blades range in length from ten to 12inches (25.4 to 30.48 cm), although six-inch (15.24 cm) blades can be purchased to fit smaller Bandsaw models. A device that applies force changes the direction of a force or changes the strength of a force, to perform a task, generally involving work done on a load. s are often fabrication to yield a high mechanical advantage to reduce the effort needed to do that work. Simple a wheel, a lever, or an inclined plane. All others can be built using combinations of these simple s.
Example: A drill uses a combination of gears (wheels) to drive helical inclined planes (the drill bit) to split material and carve a hole in it.

2. SCOPE OF THE PROJECT

1. It generates sustainable and practical solutions for the future industrial development
2. They can solve the problem of time consumption.
3. Waste of resources in face of labor costs is reduced.
4. They can be used in the industry where it is manufactured, in the packaging sector.
5. It is used as hardware in large quantities like in fabrication
6. It provides an alternative for industries aiming toward reducing human effort.

3. OBJECTIVES OF THE PROJECT

1. To cater to the issue of competition in the mechanical industry the need for solar energy is assessed by all the industry.
2. Identify the key policy avenues considered to be appropriate to meet the challenge of sustainable manufacturing and packaging industry for the future.
3. To provide alternatives for industries aiming towards reducing human efforts.
3. To provide alternatives for industries aiming toward reducing human effort.
4. Sustainable and practical solutions for the future industrial environment.

4. LITERATURE REVIEW

General After the study of many kinds of literature about the fabrication, construction, and working of solar power Band Saw s, some of them describe the methodology of solar power Band Saws. Lots of factors have been considered for the fabrication, construction, and working of a Hybrid applying solar power Band Saw such as cutting speed, cutting material, cutting time, power, efficiency, etc. So, lots of works of literature have been found that give relevant information and methodology for constructing a solar power Band Saw. Mounting of various parts of the Band saw holding shaft connected to the wheel, mounting of clamp & inserting a shaft into the clamp mounting of bench vice to the base table .wheel on which the band saw is mounted and it is connected to the dc motor at the bottom side of wheels which, DC motor is has further6 connections of solar circuits.

5. HISTORICAL BACKGROUND

The problem of cutting-off material to size is common in practically every industry. Often, sawing is the first operation carried out on bar stock. Therefore, it is surprising that so little work has been done to understand the problems of this common operation. Many reasons have been considered better methods. Often the foreman will assign a new trainee to a sawing task, on the principle that it is easy to learn. Furthermore, cut-offs are frequently housed in stores away from the main production areas and the operation of the sawing s appears to be simple. The fact remains that cutting-off operations can account for a significant part of the cost per piece. The reason for carrying out the present work is the growing realization on the part of manufacturers of both blades and s, that the factors which control the mechanics and economics of power band saw cutting are complex. Also, power band saw cutting has been receiving increased competition from other cutting-off processes, such as band and circular sawing. Whilst the British standard BS 1919: 1974 gives specifications for band saw blades regarding dimensions etc.

The manufacturers of band saw blades and users have experienced considerable difficulty in establishing standard testing procedures and in obtaining consistency in test data using power band saws Preliminary investigations by the author have revealed that existing blade testing methods were not independent of the characteristics, which could contribute to one of the reasons for the inconsistency in the test data. Hence, there has been a requirement to identify the characteristics under normal working conditions and to investigate the mechanics of the sawing process and the variables affecting the metal removal rate.

Most of the early published work on cutting-off has been primarily concerned with circular and band sawing and cost comparisons between alternative processes. Whilst these alternative processes are frequently, quicker than power band saw cutting, their costs are in many applications higher. Whilst the impact of these alternative processes on the application of power band saw cutting cannot be denied there remains a significant field of application for power band saw cutting which is likely to remain unchallenged. A factor of prime interest to manufacturers is that, if the costs of power Band Saw cutting can be reduced by developing the blade and the saw, the potential field of application will be widened. During the past fifty years, very little attention has been devoted to developing the geometry of the Band Saw blade or the although, some improvements in the blade material, together with methods of applying the load and mechanized work handling, have been achieved (Nelson,1965)

5.1 Sawing

If all raw stock was delivered in ready-to-shapes and sizes, there would be no need for sawing s in a metal working shop. Operators could merely go over to the stock, select the suitable workpiece, and perform the necessary finishing operations. Such a situation rarely exists, because the majority of the stock requires to be cut in some way before starting a machining schedule.

The alternative to this primary operation of sawing is to buy in prepared lengths and shapes; this, however, introduces a service that the company has to pay for and, in the majority of cases, it is simpler and more economical to carry out the basic cutting-to-size operation in-house. One of the major advantages of sawing over all other kinds of machining is the narrowness of cut op. Most sewing s perform the cut-off operation, where a piece of stock is cut to a workable length before subsequent machining operations. That accomplishes this job includes hacksaws, band saws, and circular saw.

5.1.1 Working on Band saw construction

The name indicates "Dual Powered Band saw cutting the runs on a dual energy source primary source is an AC supply and the secondary source is to DC supply through the battery. The project consists of a battery 12V band saw belt with 16 TPI, Double pole double throw switch, blade guide bearing, indication board, and voltage indicator. 2-pin AC supply cable driven wheel adjusting with rod and nut, two wheels, solar panel, solar charged controller, DC motor, SMPS (Switch mode power supply), a body frame, etc.

The battery charging time is four hours and the usage time is 2 to 2.5 Battery wire is connected to the solar charge controller, SMPS (Switch mode power supply), toggle switch, voltmeter, DC motor, and indication board. They charge the battery, and from the AC supply, there will be a connector present in front of the battery. While plugging their connector through the AC supply. Battery charging.
The voltage will be showing in the voltmeter at the same time green LED light glow in the indicator board which means the will run on an AC supply. To charge the battery through a DC supply there will be a connector '2" present in the solar charge controller whenever it is required.
If the battery is low then plug in connector "2" on the other end of the connector is wired to the solar panel which from rays the battery will charge in the solar charge controller: The charging light will be low if the battery is full then the charging light will OFF.
At the left side of the project model there will be the pocket where the solar panel Frame body of the project model had made of mild steel at the top of the will placed model there will be the driver wheel adjusted which is used to tighten the saw blade as if we want to change the saw blade or damage the Made lose the m from big size bolt and remove the belt from wheels.

6. DIAGRAM AND METHODOLOGY

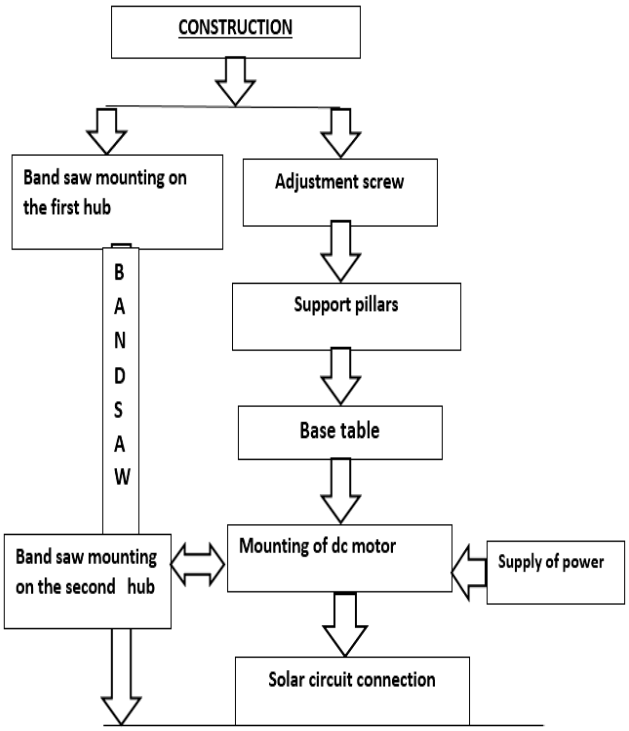


Fig-1: construction of band saw

6.1 3D Model of Band Saw

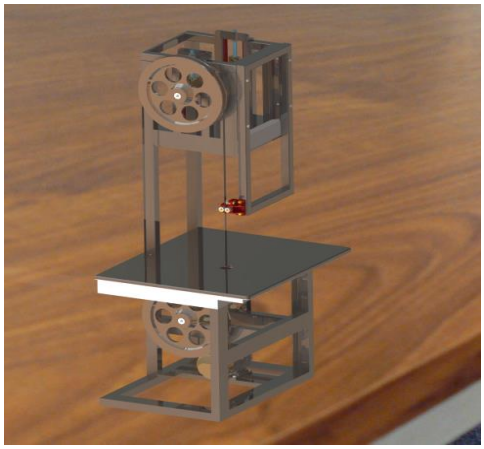


Fig-2: Iso-metric view.

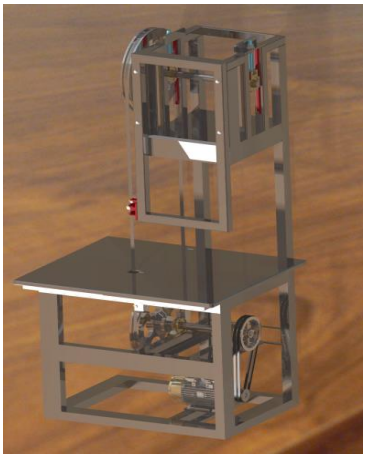


Fig-3: Front View

7. WORKING ON PROJECT MODEL

The working is based on two parts of the machine as follows: 7.2.1) Working through AC supply.

- Working through AC supply.
- Working through DC supply

7.1 Working through AC supply

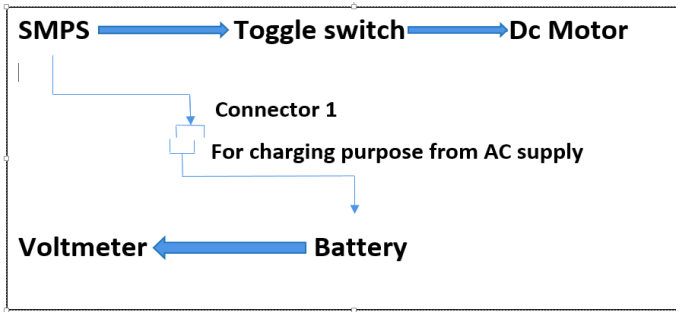
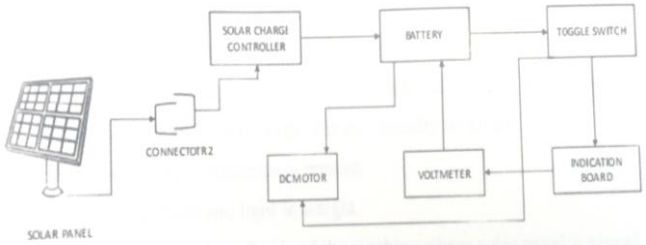


Fig-4: Block Diagram of working through AC Supply

If we want to operate the machine through an AC supply then put a plug in the board and switch ON the button. The SMPS (switch mode power supply) reduced volt from age 220v to 110v and converted from Ac to DC supply and this SMPS I directly connected to the DC motor and toggle switch and indication board with the help of a wire. So that machine will operate through an AC supply If we want to run a machine with an AC supply plug in the plug-in AC supply bound switch ON the button and move the toggle switch to the AC supply direction machine will run through the AC supply at the same time LED light will glow in 3) If we want to charge the battery through AC supply the compact the connector AC supply which shows machine will run through AC supply
"1" as shown in the figure. The battery will charge through an AC supply by converting its voltage from SMPS and showing the reading of the battery through a voltmeter below the 12v mean battery is low and above the 12V then the battery is fully charged.
In this way, the working principle will do through h AC supply and band saw machine start work.

7.2 Working through DC supply



The function of the solar charge controller is shown as the indication of the battery is low then the bathing battery's low light will glow and gives the sign of the battery is low. If we want to charge the battery through a solar panel, the charging light will be off.
If we want to charge through a solar panel just connect the connector '2' as shown in the figure. The battery will charge showing an indication on the solar charge controller.
If we want to run the machine at a DC supply just move the toggle switch to the DC supply the hen motor will start at the same time the voltmeter shows the reading off the battery. As well as same time LED light will glow on the indicator board. If the material will cut the voltage of the battery show less reading because the battery energy was material will cut the battery will show band saw machine will work and work will be done.

8. TYPES OF BAND SAW

There are various ways of classifying band saws s which can be seen elsewhere as well. The most basic and general way of classifying band saws is by their mechanism of mounting, according to which there are two types of band saws, vertical and horizontal.

8.1 Vertical Band Saw

The cutting position of the toothed steel blade in a vertical band saw s vertical. Generally, a typical vertical bandsaw is powered by an electric motor through a belt transmission mechanism. The belt here creates room for adjustment of the blade speed. The steel blade in a vertical bandsaw rotates over a fixed track between the idler wheel, which is mounted above the work table, and the drive wheel is mounted under the work table and cuts into the sides of the stock material. To cut the stock, the stock is moved against the blade. The table can be tilted front-to-back or sideways to allow metered cuts. Internal cutting is also possible in vertical bandsaws as they can weld their blades.

8.2 Horizontal Band Saw

The Horizontal band saws are floor-mounted s that are employed for jobs like simple cutting of solid steel, tubing, and other odd-shaped raw material stock. The band saw blades in horizontal band saws are also driven by an electric motor. A belt and pulley mechanism are employed to drive the motor. This mechanism creates room for the speed of the blades to be adjusted in discrete stages according to requirements.

The cutting position of the band saw steel blade in a horizontal band saw is horizontal and it makes cuts into the stock with a downward motion. The drive and idler wheels are positioned along the length of the frame, which pivots from a corner on the sawing bed. The material stock which is to be cut is mounted in a vise mounted on the bed of the.

9. MATERIAL FOR BAND SAW

9.1 Mild steel

Mild steel is a ferrous metal made from iron and carbon. It is a low-priced material with properties that are suitable for most general engineering applications. Low carbon mild steel has good magnetic properties due to its high iron content, it is therefore defined as being 'ferromagnetic'. Mild steel has a carbon content of between 0.16% and 0.29 % maximum with a relatively high melting point of between 1450°C to 1520°C. Steels with a higher carbon content than mild steel, have a lower melting temperature. This high melting temperature means that mild steel is more ductile when heated, making it particularly suitable for forging, cutting, drilling, and welding, and is easy to fabricate.

9.2 Bi-metal

High-speed steel tooth tips combined with flexible alloy steel backing material result in band saw blades that are the most cost-effective choice for most metal sawing applications. A wide variety of products are available to ensure optimal blade performance in your application. when cutting a variety of applications such as case-hardened and other exotic metals.

10. APPLICATIONS

In the modern manufacturing industry, band sawing operation is widely employed in various applications. It is most commonly utilized in

- Metal cutting
- Wood
- Cutting off a variety of other materials.
- Meat cutting

11. RESULTS AND DISCUSSION

- A band saw cutting can cut 20 to 30 mm in width. Finishing occur with accurate dimensions.
- Rubber pipes up to 120 mm can be cut.
- Eco-Friendly.
- Irregular shapes can be cut in this.

12. CONCLUSION

For to achieve accurate types of shapes in cutting wood, metal, PVC pipes, and meat we require accuracy and smooth finishing to get this, is we have required a good that completes our desires for this band saw is perfect for these such types of operations In the making of the band saw we faced many difficulties in obtaining the circular wooden block irregular shapes and sizes, and this problem can be eliminated with the help of band saw and we can make any types of irregular shapes of woods. It is too good enough for multiple cutting purposes.

13. REFERENCES

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