

FABRICATION OF SOLAR BASED AUTOMATED GRASS CUTTER MACHINE USING FLAT LINEAR MULTIPLE BLADE

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ABSTRACT

A solar grass cutter is a machine that uses flat blades to cut a lawn at an even length. Even more sophisticated devices are in every field. Power consumption becomes essential for future. Solar grass cutter is a very useful device which is very simple in construction. It is used to maintain and up keep lawns in We have to make some changes in the existing machine to make its application easier at reduced cost. Our main aim is pollution control is attained through this unskilled operation can operate easily and maintained the lawn very fine and uniform surface look. In our project, -solar grass cutter is used to cut the different grasses for the different applications. Moving the grass cutter with a standard motor powered grass cutter is an inconvenience, no one takes pleaser in it. Cutting grass cannot be easily accomplished by elderly, younger grass cutter moving with engine create noise pollution due to the louder engine. Also a motor powered engine requires periodic maintenance such as changing the engine oil. Even though solar grass cutter is environmentally friendly can be an inconvenience. Along with motor powered grass cutter, electric grass cutters are also hazardous and can't be easily used by all. Also, if the grass cutter is corded, moving could to be problematic and dangerous. The prototype grass cutter is also reachable and reduce the maintenance cost.

KEYWORDS

Introduction, parts and accessories, materials and methods, fabrications, results, conclusion

1.INTRODUCTION

A Lawn mower is a machine that uses one or more revolving blades to cut a lawn to an even height. The blades may be powered either by hand pushing the mower forward to operate the mechanical blade(s), or may have an electric motor or an internal combustion engine to spin their blades. Some mowers also include other abilities, like mulching or collecting their clippings. An electrical lawn mower is more suitable & easy to use than lawn mower with an engine, so we are making an electrical lawn mower with an electric motor, which is providing the high speed rotation to the blades. Cordless electric mowers are powered by a variable number (typically 1-2) of 12-volt rechargeable batteries. Typically, more batteries mean more run time and's the outside, the depleted batteries can be quickly swapped with recharged batteries. Cordless r power. Battery can be in the interior of the lawn mower or on the outside. If on mower have the maneuverability of a gasoline powered mower and the environmental friendliness of a corded electric mower. The design of an electrical lawn content a blades, bed knife, body frame, and wheels, push handle, bag & motor. The system there are many option, but we are using rechargeable battery motor, which is attached to the cutting blades, sizing the battery will depend on what we are powering, specifically the motor. Like batteries, there is rang of motor to choose from. We went with 24-volt motor with integrated gear heads.

1.2. TYPES OF CUTTERS:

- Grass mowers
- Lawn Tractors
- Hedge trimmers

2. PARTS AND ACCESSORIES

- Motor
- Solar panel
- Handle
- Battery
- Wheels
- Stainless steel rod
- speed regulator
- voltage indicator
- Frame

2.1. Blade

Consist of blades that are attached to a vertically rotating shaft, to the downward direction. The blade rotates, creating a cutting motion.



Fig.2.1. components of grass cutter

It's important to cut lawn, with a sharp as blade blunt blades can rip or tear grass from the roots, damaging our greenery and causing our lawn to become patchy over time. Size: -6 inches

Metal. - The blade is made of steel.

2.1. Body frame

The main structural frame of the mower into which the other parts of the mower are mounted the frame is that provides a base unit that all of the components/subsystem are mounted on. The hollow iron piped and iron sheet frame will be designed adequate sectioning for the separate sub systems. The rear wheel motors are mounted to center of the iron sheet of the frame. The battery will have a separate component for mounted in top of the iron plate. The frame is composed of 500mm*500mm*500mm with hollow iron plate to push in handle material due to its strength and availability from the frame.

2.2. Solar Panel

Solar panels are devices that convert light into electricity as shown in figure. They are called "solar" panels because most of the time, the most powerful source of light available is the Sun, called Sol by astronomers. Some scientists call them photovoltaic which means, basically, "light-electricity. This is the basis of photovoltaic conversion that is the conversion of solar energy into electrical energy. The combination of type and p-type semiconductors thus constitutes a photo-voltaic cell or solar cell. All such cells some rate direct current that can be converted into alternating current it desired. Future cells may use such materials as the semiconductors like Gallium arsenate, copper sulphate, cad sulphide etc. The device used to utilize the photovoltaic effect is solar cell.

2.3.Wheels

These help proper the mower in an action. Generally, our lawn mowers have four wheels the diameter of the wheel is 3 inches. The wheels having rubber gripped for better moving on grass. We are using wooden wheels for reducing the cost of lawn mower.

2.4.Push handle

The power source of a manually operated mower. This is a study T-shaped handle is connected to the frame wheels and blade chamber. The length of push handle is 50 inches. The hollow iron piped push handle will be designed to provide adequate sectioning for the separate sub systems.

2.5.Motor

An electric motor is a device to convert energy. The reverse of this would be the conversion and is done by a generator. In normal motoring mode, most electric motors operate through the interaction between electric motors and to generate force within the motor. In certain applications, such as in the transportation industry with, electric motors can operate in both motoring and modes to also produce electrical energy into mechanical energy.

2.6.Battery

An automotive battery is a type of rechargeable battery that supplies electric energy to an automobile. An automotive SLI battery (starting, lighting and ignition) powers the starter motor the lights, and the ignition system of a vehicle's engine.

Features: - Voltage - 12v, Weight-1.05kg, Height-7.1875 inches

2.7. components required.

Table. 2.1. components required for grass cutter

S.N.	NAME OF THE MATERIAL	SPECIFICATION	COST (Rs)
1.	GI Rods	1/2"	70/Kg
2.	Battery	12V	1800/-
3.	Rotating wheels	-	80/Each

4.	Welding electrodes	-	25/Each
5.	Electric motor	DC 12V,1500rpm	850/-
6.	Electric wire	3-leads	30/m
7.	Switch	-	30/-
8.	Bolt & Nuts	M10, M6	70/Kg
9.	Solar panel	12V,50W	2000/-
10.	Voltage indicator	12-120v	250/-
11.	Speed regulator	-	300/-
12.	Blade	12" dia	400/-

3. MATERIALS

A pipe which has had historic use as a pressure pipe for transmission of water, gas and Sewage, and as a water drainage pipe during the 19th and 20th centuries. It comprises predominantly a tube and was frequently used uncoated, although later coatings and linings Reduced corrosion and improve hydraulics. Cast iron pipe was superseded by which is a direct Development, with most existing manufacturing plants transitioning to the new material During the 1970s and 1980s.

A hollow structural section (HSS) is a type of metal with a hollow tubular. The term is used predominantly in USA, or other countries which follow US construction or engineering Terminology HSS members can be circular, square, or rectangular sections, although other shapes are Available, such as elliptical. HSS is only composed of per code. HSS is sometimes mistakenly referenced as hollow structural steel. Rectangular and square FISS are also commonly called tube steel or structural tubing.

Circular HSS are sometimes mistakenly called steel pipe though true steel is actually dimensioned and classed differently from HSS. (HSS dimensions are based on exterior dimensions of the profile, while pipes are essentially dimensioned based on interior diameters, as needed to calculate areas for flow of liquids) The corners of HSS are heavily rounded, having a radius which is approximately twice the wall thickness. The wall thickness is uniform around the section.

Rhinology in the UK, or other countries which follow British construction or engineering the term ISS is not used.

Rather, the three basic shapes are referenced as CHS, SHS, and RIHS, being circular, square, and rectangular hollow sections. Typically, these designations will also relate to metric sizes, thus the dimensions and tolerances differ slightly from IHSS.



Fig.3.1. hollow GI pipe

3.1. Process selected for assembling of Lawn Mower

- first we are cut the iron sheet with lengths of 500mm welded together at an angle of 90* between each other.
- Then the push handle (3 feet) are welded at the rear wheels' frame.
- Now three wheels are attached to the frame. The diameter of the wheels is 3" each.
- Assemble the wheels.
- Put the wheels, and the screws on the mower.
- Pull the screws using supplied screwdriver to tighten.
- An iron plate placed the mower.
- Now the 12v electric DC motor placed on the top of iron plate and center of the frame.
- Emblem the blade is fitted at the bottom side of the lawnmower to the shaft of the motor this blade fitted by the bolts.
- Assembling the Battery: - the 12v ion battery is assembled at the rear wheels of the wooden Ply.
- Now, the battery and the motor is attached for giving electric power to the motor.
- The switch is attached to the battery for ON/OFF the power supply now, lasting the mower on the ground.

3.2. Technical specifications

Table.1.2. Some other specifications

Battery type	li-on battery
Motor model	12v DC
Battery specifications	12v 7.2Ah
Battery charge time	5 to 6 hrs
Solar panel	12v 50w
Cutting height	1.5 inches
Wheel diameter	3 inches

4. Fabrication of solar grass cutting machine



Fig. fabrication of solar grass cutter

The table shown is a manually operated type. Powered tables under the control of machines are now available, and provide a fourth axis. Rotary tables are made with a solid base, which has provision for clamping onto another table or fixture. The actual table is machined disc to which the work piece is clamped are generally provided for this up this disc can rotate freely, for indexing, or under the control of a (hand wheel), with the worm wheel portion being made part of the actual table. High precision tables are driven by backlash compensating. The ratio between worm and table is generally 40:1, 72:1 or 90:1 but may be any ratio that can be easily divided exactly into 360°. This is for ease of use when they are available. A graduated dial and, often, an enable the operator to position the table, and thus the work affixed to it with great accuracy.

A through hole is usually machined into the table. Most commonly, this hole is machined to admit.

4.1. Uses of grass cutter machine

Rotary tables are most commonly mounted "flat", with the table rotating around a vertical axis, in the same plane as the cutter of a vertical. An alternate setup is to mount the rotary table on its end (or mount it "flat" on a 90° so that it rotates about a horizontal axis. In this configuration a tailstock can also be used, thus holding the work piece". With the table mounted on a secondary table, the work piece is accurately centered on the rotary table's axis, which in turn is centered on the cutting tool's axis. All three axes are thus from this point; the secondary table can be offset in either the X or Y direction to set the cutter the desired distance from the work piece's center. This allows machining operations on the work piece. Placing the work piece eccentrically a set distance from the center permits more complex curves to be cut. As with other setups on a vertical mill, the milling operation can be either drilling a series of concentric, and possibly equidistant holes, or face or end milling either circular or semi-circular shapes and contours.

A rotary table can be used:

- To machine spanner flats on a bolt

- To drill equidistant holes on a circular flange
- To cut a round piece with a protruding tang.
- To create large-diameter holes, via milling in a circular tool pal, on small milling machines that don't have the power to drive large twist drills +0.500/ 13 mm).
- To cut complex curves (with proper setup),
- To cut straight lines at any angle.
- To cut arcs.
- With the addition of a compound table on top of the rotary table, the user can move to center of rotation to anywhere on the part being cut. This enables are to be cut at any place on the part.
- To cut circular pieces.

Additionally, if converted to operation, with a CNC milling machine and a, a rotary table allows many parts to be made on a mill that otherwise would require the power source of a lawn mower that is powered by electric. The electric motor for lawnmowers the typically 12v DC motor. The benefits of the electric motor are that there run very quietly and there do not take of too much space on the mower chassis.

4.2. FEATURES:

- ✓ Time taken is less when compared to lawn movers.
- ✓ They are eco-friendly.
- ✓ It helps in reducing labor wages and fatigue.
- ✓ It is easy to control.
- ✓ We can use this in narrow places, which we cannot reach by a lawn mower.
- ✓ Maintenance cost is less.
- ✓ Power and Convenience.
- ✓ Ease of Use.
- ✓ Safety Concerns.
- ✓ Versatility and durability.

4.3. COST SURVEY

now a Days grass trimmers are available at Rs 5000/- to 7000/-in the market hence compared to them our product costs less (@2040/- as its investment cost is low it not cost is low it can be fracture by even small scale industry also.

A Grass cutter is a machine which can cut the grass for the required level. A string also called a "weed eater" or a "weed-whacker", is a tool which uses a trimmer means it is flexible monofilament line instead of a blade for cutting grass machine capable of cutting weed and grass. Other plants near objects, or on steep or irregular terrain. It consists of a cutting head at the end of a long shaft with a handle or handles and sometimes a shoulder strap. String trimmers may also be known as whippier snipers, weed whips, hedge trimmers, line trimmers, and trimmers.

5. CALCULATIONS AND RESULT

$$P = (2 \cdot 22/7 \cdot N \cdot T) / 60$$

P=Power

N=Speed of the motor

T=Torque

Then $P = V \cdot I$

where

V=Voltage

I=Current

Torque and power of the motor with no load condition

$$P=V*I$$

$$P=12*25$$

$$P=300W$$

$$N=1500 \text{ RPM}$$

Then

$$P= (2*22/7*N*T)/60$$

$$300= (2*22/7*1500*T)/60$$

$$T=1.909N-m$$

Torque and power of the motor with load conditions

$$P=V*I$$

$$P=12*29$$

$$P=348W$$

$$N=1500 \text{ RPM}$$

Then

$$P= (2*22/7*N*T)/60$$

$$348= (2*22/7*1500*T)/60$$

$$T=2.215N-m.$$

6. CONCLUSION

Our project entitled Fabrication of SOLAR GRASS CUTTER results obtained are satisfactory. It will be project for the further modifications. This project is more suitable for having much more advantages, no fuel cost, no pollution and no tear because of less number of moving components and electrical energy. This will give much more physical exercise to the people and can be easily handled. As we are nearer to Equator, the electrical energy (nonconventional energy) is vastly available, so it is easy to charge the battery and is also pollution free. But the initial investments of the mechanical grass cutter is high. At present in order to curtail global warming and ozone depletion, the industries are producing these components in mass productions, so the cost of the system may come down. This system is having facility of recharging the batteries while the electrical powered grass cutter is in motion. So it is much more suitable for grass cutting also. the grass cutting machine was successfully fabricated solar grass cutter is successfully completed and the easier for the people who are going to take the fuel residue, less wear and this can be operated by using and is under trials at the Pydah collage of engineering. The trial tests are so far in coherence with the simulated results. The machine will be launched for the commercial use shortly.

ACKNOWLEDGEMENT

First of all, I thank the Almighty God for all the support he has given me in this project. It is a matter of pride and privilege for me to express my deep gratitude to the management of **PYDAH COLLEGE OF ENGINEERING** for providing me the necessary facilities and support. I'm highly elated in expressing my sincere and abundant respect to the Chairman **Sri P. SATYA PRASAD** and Secretary **Sri P. SRIRAM** for giving me this opportunity to bring out and implement my ideas in this project.

I express my sincere and heartfelt gratitude to **Dr. P.V. SURYA PRAKASH** principal of **PYDAH COLLEGE OF ENIGINEERING** for his valuable support and encouragement. We thank our honorable dean **Sri.M. VEERABADHAR RAO** for providing us good faculty support throughout our course I express my sincere and heartfelt gratitude to **Mr. B.V.V.V.B. LAKSMIPATI RAO** Assistant professor (Head of Mechanical Department) for his valuable support and encouragement.

I would like to convey my sincere gratitude to my project supervisor **Mr.T. Nani Assistant Professor** Department of Mechanical Engineering for his valuable suggestions, motivation and guidance for carrying out related experiments and for preparing the associated reports and presentations. His encouragement towards the current topic helped me a lot in this project work. I would like to convey my sincere gratitude to my project coordinator **Mr.T. Nani (M. Tech)** Assistant Professor, Department of Mechanical Engineering for his support to keep the project work in right track.

I would like to convey my sincere gratitude to my lab assistant **Mr. V. NARENDRA VARMA** Department of Mechanical Engineering for his support to our project. Last but not the least. I am deeply indebted to my parents who have been the greatest support during my course of study.

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