International Journal of Engineering Research and Science & Technology

ISSN 2319-5991 www.ijerst.com
Vol. 22, No. 1, 2026
© 2026 IJERST. All Rights Reserved

Research Paper

MOVABLE GRINDER BY USING SOLAR PANEL AND BATTERY

[1] Mr.Y.Suresh, [2] MEEGADA UMA NAGA RAJU, [3] G. VIGNESHWARDAS, [4] DHARAVATH SIMHADRI

[1] Assistant Professor, Department of Mechanical engineering,
[2,3,4] U.G. Scholar, Department of Mechanical engineering,
Sri Indu College of Engineering & Technology, Hyderabad.

***Abstract*- Energy is the primary and most universal measure of all kinds of work by human beings and nature. Solar energy is one of the non – conventional energy source; this will eco-friendly and also reduce the cost of electric power. In this project is to design and fabrication of auto charging grinding machine powered by solar power. The model is developed by using Creo software and AUTOCAD, and then fabrication is carried out this model. Our grinding machine is fabricated to grind different materials and size of the job. The grinding wheel is rotated by single phase DC motor. 12V DC battery powers the DC motor. The battery is charged by using Solar panel and alternator which is coupled to the grinding machine shaft.**

***Index Terms*- Fabrication, Grinding Machine, Solar Panel and Battery.**

I. INTRODUCTION

Aim of the research work is to design and fabricate auto charging grinding machine. It is used to grind the machining surfaces to super Finish and accuracy. The principle parts of this attachment are main body, motor with pulley, bearings, rope pulley and alternator etc. So this project solar powered auto charging grinding machine is very much useful, since it is provided with good quality of power sources and simple operating mechanism. Hence each and every drop of fuel saves our economy and meets the needs is the saturation point that is to be attained as soon as possible.

In order to achieve this saturation point we have to save and seek for some other source of power. This power, the alternate power must be much more convenient in availability and usage. The next important reason for the search of effective, unadulterated power are to save the surrounding environments including men, machine and material of both the existing and the next fourth generation from pollution, the cause for many harmfulhappenings and to reach the saturationpoint. The most talented power against the natural resource is supposed to be the electric and solar energies that best suitthe automobiles. The unadulterated zero emission electrical and solar power, is the only easily attainable alternatesource. [1]

Hence we decided to incorporate the solar power in the field of automobile, the concept of many Multi-NationalCompanies (MNC) and to get relieved from the incorrigible air pollution. Need for non-conventional energy sources.Energy is the primary and most universal measure of all kinds of work by human beings and nature. Everything whathappens in the world is the expression of flow of energy for input to their bodies or to the machines and thinks about crude and electric power. The energy sources available can be divided into 3 types [2]:

1. Primary Energy Sources
2. Secondary Fuels
3. World Energy Future

A. PRIMARY ENERGY SOURCES:

Primary energy sources can be defined as sources, which provide a net energy. Coal, Oil, uranium etc., are examples of this type. The energy required to obtain these fuels is much less than what they can produces by combustion or nuclear reaction. Their energy yield ratio is defined as the energy feedback by the material to energy received from the environment becomes very essential to use these fuels sparingly. Primary fuels contribute concededly to the energy supply.

B. SECONDARY FUELS:

It produces no net energy though it may net energy yield ratio and those highest investments in terms of energy. Insulation is an example for this source. Coal, Natural gas, Oil and Nuclear energy using Breeder reactor are net energy yielder and are primary sources

of energy. Secondary sources like solar energy, Wind energy, Water energy etc. Solar energy can be used through plants, solar cells and solar heaters. Solar tower is another emerging technology. Solar drying and solar heating are economical applications when passive methods are used. Because of dilute nature of solar energy it is difficult to classify the sources as primary one. Better sources are wind. Tidal, wave and hydroelectric application, Geothermal and ocean thermal are other sources, which may well prove worthwhile. It may be necessary in future to develop the secondary sources like solar, wind etc. Energy is an important input in all sectors of any country economy. The standard of a given country can be directly related to per capital energy consumption. Energy crisis is due to two reasons first the increase of population and the second is the standard of living of human being has increased. The supply of oil willfail to meet the increasing demand before the year 2020 even if energy crisis rise 50% above current levels in real terms.Additional constraints on oil production will hasten this shortage, thereby reducing the time available for action onalternatives. Electricity from nuclear power is capable of making an important contribution to the global energy supply although worldwide acceptance of it, on a sufficiently large scales yet to be established. Fusion power will not be sufficient before the end of 2020. [7]

C. WORLD ENERGY FUTURE:

If present trend continues, the world in the year 2020 A.D. will be more crowded than that of today. The worldpopulation may reach 10 billion by 2020 A.D. the conventional energy sources are depleting and may be exhausted by thebeginning of next century. Nuclear energy requires skilled technician and poses the safety as regards to radioactive wastedisposal. Solar energy and other non-conventional energy sources are to be utilized in future. Coal has the potential tocontribute substantially to the future energy supplies. Coal reserves are abundant but taking advantages of them requiresan active program of development by both producers and consumers. Natural gas reserves are large enough to meetprojected demand provided the incentives are sufficient to encourage development of extensive and costly inter-continentalgas transportation system. Other than hydroelectric power, renewable resources of energy example solar, wind, wave are unlikely to contribute significant quantities of additional energy during the century at global level although they could be of importance in particular areas they are likely to become increasingly important in the mid of 21st century.[7]

II. SOLAR ENERGY

Solar energy has the greatest potential of the sources of renewable energy and if only a small amount of this form ofenergy could be used.

Solar radiation is the diffusion radiation. The solar power where sun hits atmosphere is 10^{17} watts. Whereasthe solar power on earth's surface is 10^{16} watts. The total worldwide power demand of all needs of civilization is 10^{13} watts.Therefore the sun gives as 1000 times more power than we need. The sun radiates energy as electromagnetic waves ofwhich 99 percent have wavelengths in the range of 0.2 to 4.0 meters. Solar energy reaching the top of the earth'satmosphere consists of about 8 percent ultraviolet radiation, 46 percent visible lights, and 46 % infrared Radiation. If weuse only 5% of energy it will be 50 times what the world will require. The energy radiated by the sun on a bright sunnyday is approximately 1 km/m². Now days the drawbacks as pointed out that energy cannot be stored and it is a dilute formof energy, are not dated arguments. Utilization of solar energy is of great importance to India, since of lies in atemperature climate of the region of the world where sunlight is abundant for a major part of year. Solar energy is a timedependent and intermitted energy Resource.

International Journal of Engineering Research and Science & Technology

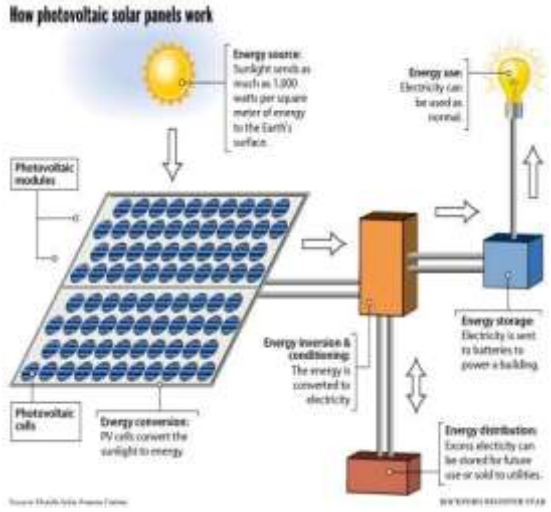


Figure 1: Solar Energy

METHODS OF UTILISATION OF SOLAR ENERGY

1. DIRECT METHOD

a. Photo Voltaic Method

b. Thermal Method

2. INDIRECT METHOD

a. Water Power Method

b. Wind Power Method

c. Bio Mass Method

d. Wave Energy Method

e. Ocean Power Method

DIRECT METHOD OF UTILIZATION OF SOLAR ENERGY:

The most useful way of harnessing solar energy is by directly converting it into electricity by means of solar photovoltaic cells. Sunshine is incident on Solar cells, in this system of energy Conversion that is direct conversion of solarradiation into electricity. In the stage of conversion into thermodynamic from is absent. The photo-voltaic effect is definedas the generation of an electromotive force as a result of the absorption of ionizing radiation. Energy conversion devices,which are used to convert sunlight to electricity by use of the photo-voltaic effect, are called solar cells.

In recent years photo-voltaic power generation has been receiving considerable attention as one of the more promisingenergy alternatives. The reason for this rising interest lie in PV's direct conversion of sunlight to electricity, the nonpolluting nature of the PV widespread are of PV generation has been hampered by economic factors. Here to force, thelow cost of conventional energy sunlight has obviated the development of a broad-based PV technology.

At the present time, PV generation can be justified only for special situations mostly for remote s ites where utility lineson other conventional means of furnishing energy may be prohibitively expensive and is one of the most attractive nonconventional energy sources of proven reliability from the micro to the Mega-watt level.Like other energy system this system also has some disadvantages

(1) Distributed nature of solar energy,

(2) Absence of energy storage,

(3) Relatively high capital cost PHOTO

VOLTAIC METHOD:

PHOTOVOLTAIC PRINCIPLES: The photo-voltaic effect can be observed in nature in a variety of materials that haveshown that the best performance in sunlight is the semiconductors as stated above. When photons from the sun areabsorbed in a semiconductor, that create free electrons with higher energies than the created there must be an electric fieldto induce these higher energy electrons to flow out of the semi-conductor to do useful work. A junction of materials,which have different electrical properties, provides the electric field in most solar cells.

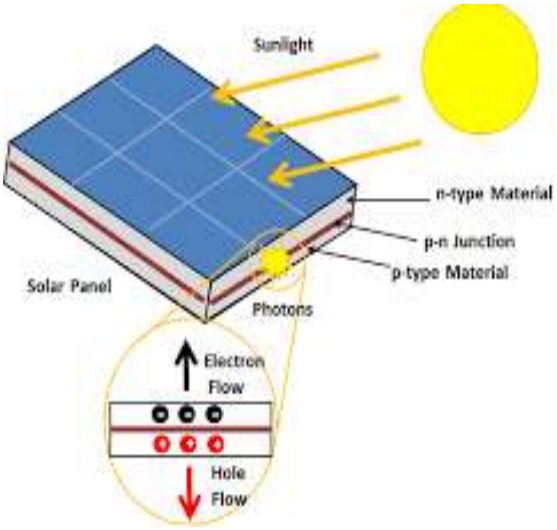


Figure 2: Photovoltaic Effect

III. GRINDING MACHINE

A grinding machine, often shortened to grinder, is any of various power tools or machine tools used for grinding, which is a type of machining using an abrasive wheel as the cutting tool. Each grain of abrasive on the wheel's surface cuts a small chip from the work piece via shear deformation.

Grinding is used to finish work pieces that must show high surface quality (e.g., low surface roughness) and high accuracy of shape and dimension. As the accuracy in dimensions in grinding is of the order of 0.000025 mm, in most applications it tends to be a finishing operation and removes comparatively little metal, about 0.25 to 0.50 mm depth. However, there are some roughing applications in which grinding removes high volumes of metal quite rapidly. Thus, grinding is a diverse field.

Conventional grinding machines can be broadly classified as:

(a) Surface grinding machine
(b) Cylindrical grinding machine
(c) Internal grinding machine
(d) Tool and cutter grinding machine

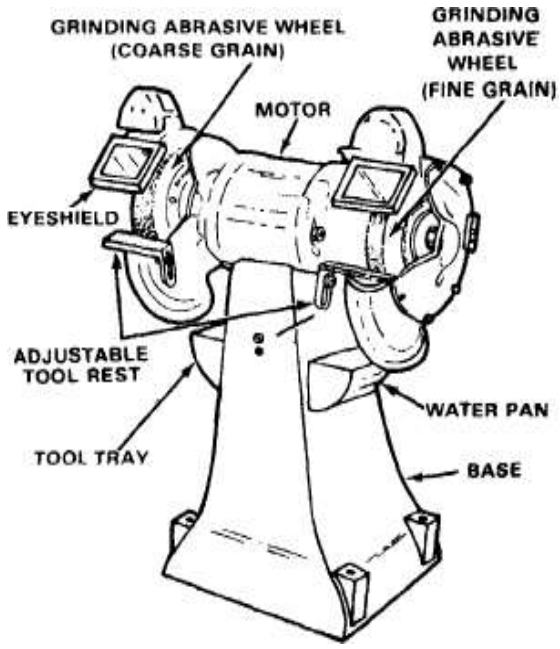


Figure 3: Grinding Machine

III. FABRICATION

COMPONENTS

A.DC Motor

A DC motor is any of a class of rotary electrical machines that converts direct current electrical energy into mechanical energy. The most common types rely on the forces produced by magnetic fields. Nearly all types of DC motors have some internal mechanism, either electromechanical or electronic; to periodically change the direction of current flow in part of the motor.

DC motors were the first type widely used, since they could be powered from existing direct-current lighting power distribution systems. A DC motor's speed can be controlled over a wide range, using either a variable supply voltage or by changing the strength of current in its field windings. Small DC motors are used in tools, toys, and appliances. The universal motor can operate on direct current but is a lightweight motor used for portable power tools and appliances. Larger DC motors are used in propulsion of electric vehicles



Figure 4: Fabricated Model

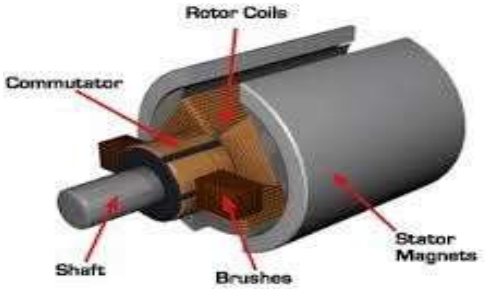


Figure 5: DC Motor

elevator and hoists, or in drives for steel rolling mills. The advent of power electronics has made replacement of DC motors with AC motors possible in many applications.

B. Alternator

An alternator is an electrical generator that converts mechanical energy to electrical energy in the form of alternating current. For reasons of cost and simplicity, most alternators use a rotating magnetic field with a stationary armature. Occasionally, a linear alternator or a rotating armature with a stationary magnetic field is used. In principle, any AC electrical generator can be called an alternator, but usually the term refers to small rotating machines driven by automotive and other internal combus tion

engines. An alternator that uses a permanent magnet for its magnetic field is called a magneto. Alternators in power stations driven by steam turbines are called turbo-alternators. Large 50 or 60 Hz three phase alternators in power plants generate most of the world's electric power, which is distributed by electric power grids.



Figure 6: Alternator

C. Solar Panel

Photovoltaic solar panels absorb sunlight as a source of energy to generate electricity. A photovoltaic (PV) module is a packaged, connected assembly of typically 6x10 photovoltaic solar cells. Photovoltaic modules constitute the photovoltaic array of a photovoltaic system that generates and supplies solar electricity in commercial and residential applications. A single solar module can produce only a limited amount of power; most installations contain multiple modules. A photovoltaic system typically includes an array of photovoltaic modules, an inverter, and a battery pack for storage, interconnection wiring, and optionally a solar tracking mechanism.



Figure 7: Solar panel

A single solar module can produce only a limited amount of power; most installations contain multiple modules. A photovoltaic system typically includes an array of photovoltaic modules, an inverter, and a battery pack for storage, interconnection wiring, and optionally a solar tracking mechanism.

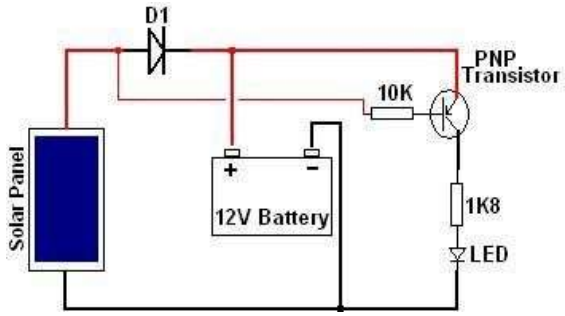


Figure 8: Solar Panel Circuit

D. Battery

In our project we are using 12V Lead- Acid battery.

E. Grinding Wheel

A grinding wheel is a wheel composed of an abrasive compound and used for various grinding (abrasive cutting) and abrasive machining operations. Such wheels are used in grinding machines.

The wheels are generally made from a composite material consisting of coarse-particle aggregate pressed and bonded together by a cementing matrix (called the bond in grinding wheel terminology) to form a solid, circular shape. Various profiles and cross sections are available depending on the intended usage for the wheel. They may also be made from a solid steel or aluminum disc with particles bonded to the surface. Today most grinding wheels are artificial composites made with artificial aggregates, but the history of grinding wheels began with natural composite stones, such as those used for millstones.



Figure 9: Grinding Wheel

The manufacture of these wheels is a precise and tightly controlled process, due not only to the inherent safety risks of a spinning disc, but also the composition and uniformity required to prevent that disc from exploding due to the high stresses produced on rotation.

Grinding wheels are consumables, although the life span can vary widely depending on the use case, from less than a day to many years. As the wheel cuts, it periodically releases individual grains of abrasive, typically because they grow dull and the increased drag pulls them out of the bond. Fresh grains are exposed in this wear process, which begin the next cycle. The rate of wear in this process is usually very predictable for a given application, and is necessary for good performance

S.No	COMPONENTS	DESCRIPTION
1	DC Motor	12V-3000rpm
2	Alternator	12V-3000rpm
3	Bearing	⌀25mm
4	Battery	12V Lead-Acid
5	Shaft	Mild Steel
6	Solar Panel	12V-24V output
7	Frame Stand	Mild Steel
8	Connecting Wires	Copper
9	Bolt and Nut	Mild Steel
10	Pulley	⌀25mm

Table 1: Components Description

IV. WORKING PRINCIPLE

This machine is fixed on the work table, where the compound rest. When the motor is on, the abrasive grinding stoneand the roller wheel will be rotated. The solar panel is used to store the electrical energy to the battery. The battery givesthe supply to the D.C motor which is coupled to the generator and grinding machine with the help of belt drive as shown indiagram

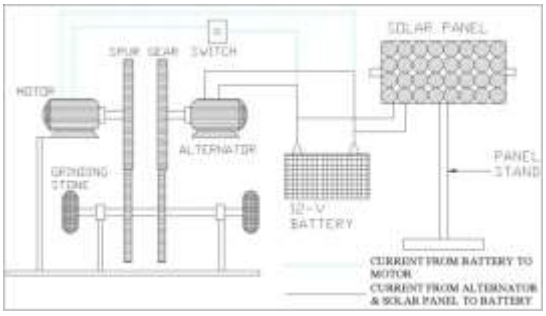


Figure10: Working Process

Solar energy means all the energy that reaches the earth from the sun. It provides daylight makes the earth hot and isthe source of energy for plants to grow. Solar energy is also put to two types of use to help our lives directly solar heatingand solar electricity. Solar electricity is the technology of converting sunlight directly in to electricity. It is based on photovoltaic or solar modules, which are very reliable and do not require any fuel or servicing. Solar electric systems are suitablefor plenty of sun and are ideal when there is no main electricity.

V. CONCLUSION

This report details with design and "solar powered auto charging grinding machine" .Theproject carried out by us made an impressing task in the shaping works of all types of work piece. It is very useful for thesmall scale industries in order to minimize the manufacturing cost by implementing the solar powered automatic grindingmachines to make shape of small elements after the machining process. This project has been designed to perform theentire requirement task, which has also been provided. This type of fixture is mainly used in production field for grindingthe all types of small scale elements firmly and securely to perform operations and is mainly used in manufacturing -oriented industries.

This project is focusing on solar powered grinding machine instead of other electrical power sources. With the help of software Creo we modeled and fabricated and the fabricated model will give the results are listed below,

- Free of power
- Less maintenance
- Grind different size and materials
- Increase the speed up to 10000Rpm by changing the pulleys
- Eco friendly

REFERNCES

[1] Machine tools and tool design by P.C. Charma published by S.Chand and company.
[2] solar powered auto charging grinding machine
[3] Design of jigs, fixtures and press tools by C. Elanchezhian, T. Sunderselwyn, B. vijaya Ramnath Published by Eswar press.
[4] Design of jigs, fixtures and press tools by Venkataraman published by Tata McGraw hill.
[5] A Review on Agricultural robots, International Journal 7, July 2015. (International Journal of Advanced Research in Computer Engineering & Technology (IJARCET) Volume 4 Issue 7, July 2015.)

[6] Sensor Based Multipurpose Agricultural Cutter.(International Research Journal of Engineering and TechnologyMay-2016.)

[7] Solar Based Wireless Grass Cutter ,IJSTE ,May 2016.(IJSTE - International Journal of Science Technology &Engineering , May 2016)

[8] Pollution Free SolarPoweredBrush Cutter. (International Journal of Emerging Technology and Advanced Engineering, MAY 2015)