

Solar Powered Drilling Machine

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Abstract - This project is fabrication of solar power drilling machine which shows capability of drilling other than old. Other than that, it is important to studies on pneumatic for drilling which are the main topic for this project. So, at the end of this project, we will practicing on how to build and steps to follow to complete the requirement for this project.

1. INTRODUCTION

This project are also provided to familiarize ours about the technology on drilling a metal which is used pneumatic concept yet has rapidly grown especially in the automotive and electrical industry. Furthermore, the strong concern is to obtain better product quality with lower cost. Then, drilling is important processes in the metal industry; the former is flexible in processing whilst the latter is effective in production. To combine the advantages of both, the so-called combination machines that combine the drilling processes are used in metal processing. Using pneumatic systems is economical and environmentally friendly, as air is inexpensive, plentiful and easily compressed and stored in tanks. On other hand quality and productivity play important role in today's manufacturing market. Now a day's due to very stiff and cut throat competitive market condition in manufacturing industries. The main objective of industries reveal with producing better quality product at minimum cost and increase productivity.

Let, we briefly explain about our new project carried out in drilling choose from referring a various research and development of drilling process in earlier days to current trend process. And also to explain about our project experimental procedures, results and conclusions as follow.

.1 Basic Principles of Drilling

Drilling is a cutting process that uses a drill bit to cut or enlarge a hole of circular cross-section in solid materials. The drill bit is a rotary cutting tool, often multipoint. The bit is pressed against the work piece and rotated at rates from hundreds to thousands of revolutions per minute. This forces the cutting edge against the work piece, cutting off chips from the hole as it is drilled.

A drill is a tool fitted with a cutting tool attachment Drill scheme or driving tool attachment,

usually a drill bit or driver bit, used for boring holes in various materials or fastening various materials together with the use of fasteners. The attachment is gripped by a chuck at one end of the drill and rotated while pressed against the target material. The tip, and sometimes edges, of the cutting tool does the work of cutting into the target material. This may be slicing off thin shavings, grinding off small particles, crushing and removing pieces of the, countersinking, counter boring or other operations.

Drills are commonly used in woodworking, metalworking, construction and do-it-yourself projects. Specially designed drills are also used in medicine, space missions and other applications. Drills are available with a wide variety of performance characteristics, such as power and capacity.

1.2 Types of Drilling Machines

There are two types of drilling machines used by maintenance personnel for repairing and fabricating needed parts: hand-feed or power-feed. Other types of drilling machines, such as the radial drill press, numerically controlled drilling machine. Multiple spindle drilling machine, gang drilling machine, and turret drill press, are all variations of the basic hand and power-feed drilling machines. They are designed for high-speed production and industrial shops.

Drilling depth is controlled by a depth-stop mechanism located on the side of the spindle. The operator of the machine must use a sense of feel while feeding the cutting tool into the work. The operator must pay attention and be alert, to when the drill breaks through the work, because of the tendency of the drill to grab or snag the work piece, wrenching it free of its holding device. Due to the high speed of these machines, operations that require drilling speeds less than 450 revolutions per minute cannot be performed. Reaming, counter boring, and

counter-sinking may require slower speeds than drilling and may not be able to be performed for all materials on these machines.

1.2.1 Power-Feed

The power-feed drilling machine as shown in Fig 1.2 is usually larger and heavier than the hand-feed. They are equipped with the ability to feed the cutting tool into the work automatically, at a preset depth of cut per revolution of the spindle, usually in thousandths of an inch per revolution. These machines are used in maintenance shops for medium duty work, or work that uses large drills that require power feeds. The power-feed capability is needed for drills or cutting tool that are over 1/2 inch in diameter, because they require more force to cut than that which can be provided by using hand pressure. The speeds available on power-feed machines can vary from about 50 RPM to about 1,800 RPM. The slower speeds allow for special operations, such as counterboring, countersinking, and reaming.

The sizes of these machines generally range from 17-inch to a 22-inch center-drilling capacity, and are usually floor mounted. They can handle drills up to 2 inches in diameter, which mount into tapered Morse sockets. Larger workpieces are usually clamped directly to the table or base using T-bolts and clamps, while small workpieces are held in a vise. A depth-stop mechanism is located on the head, near the spindle, to aid in drilling to a precise depth.

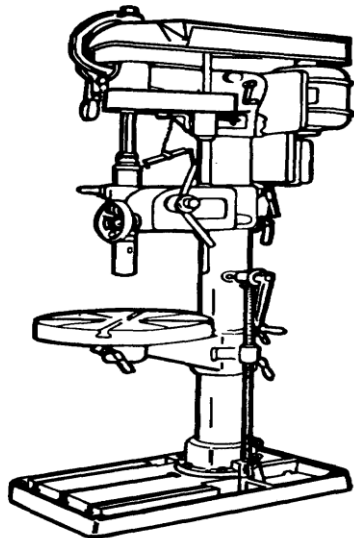


Fig 1: Power-Feed drilling machine

1.2.2 Radial Drill Press

A radial arm drill press as shown in Fig 1.3 is a large geared head drill press in which the head can be moved along an arm that radiates from the machine's column. As it is possible to swing the arm relative to the machine's base, a radial arm drill press is able to operate over a large area without having to reposition the work piece. This saves considerable time because it is much faster to reposition the drill head than it is to unclamp, move, and then re-clamp the workpiece to the table. The size of work that can be handled may be considerable, as the arm can swing out of the way of the table, allowing an overhead crane or derrick to place a bulky work piece on the table or base. A vise may be used with a radial arm drill press, but more often the work piece is secured directly to the table or base, or is held in a fixture. Power spindle feed is nearly universal with these machines and coolant systems are common. Larger size machines often have power feed motors for elevating or moving the arm. The biggest radial arm drill presses are able to drill holes as large as four inches (101.6 millimeters) diameter in solid steel or cast iron.

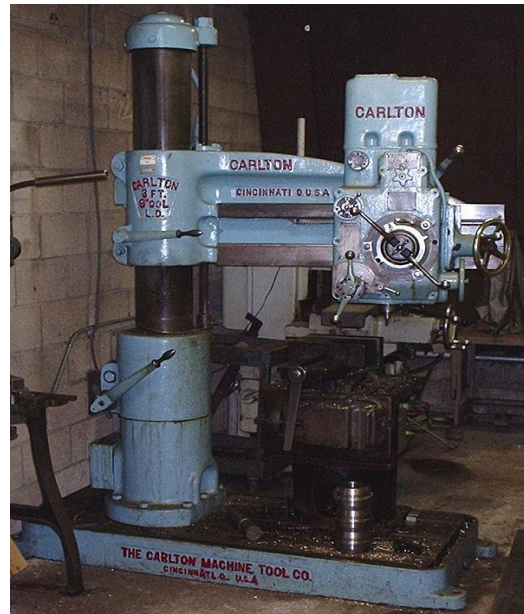


Fig 2: Radial Drill Press

1.3 Characteristics of Drilling Machine

All drilling machines have the following construction characteristics: A spindle, Sleeve or quill, column, head, worktable, and base.

The spindle holds the drill or cutting tools and revolves in a fixed position in a sleeve. In most

drilling machines, the spindle is vertical and the work is supported on a horizontal table.

The sleeve or quill assembly does not revolve but may slide in its bearing in a direction parallel to its axis. When the sleeve carrying the spindle with a cutting tool is lowered, the cutting tool is fed into the work; and when it is moved upward, the cutting tool is withdrawn from the work. Feed pressure applied to the sleeve by hand or power causes the revolving drill to cut its way into the work a few thousandths of an inch per revolution.

The column of most drill presses is circular and built rugged and solid. The column supports the head and the sleeve or quill assembly. The head of the drill press is composed of the sleeve, spindle, electric motor, and feed mechanism. The head is bolted to the column.

The worktable is supported on an arm mounted to the column. The worktable can be adjusted vertically to accommodate different heights of work or it may be swung completely out of the way. It may be tilted up to 90° in either direction, to allow for long pieces to be end or angled drilled.

The base of the drilling machine supports the entire machine and when bolted to the floor, provides for vibration-free operation and best machining accuracy. The top of the base is similar to a worktable and maybe equipped with T-slots for mounting work too large for the table.

1.4 Drilling Tools and Equipments

1.4.1 Twist Drills

Twist drills are the most common cutting tools used with drilling machines. Twist drills are designed to make round holes quickly and accurately in all materials. They are called twist drills mainly because of the helical flutes or grooves that wind around the body from the point to the neck of the drill and appear to be twisted as shown in Fig 1.4. Twist drills are simply constructed but designed very tough to withstand the high torque of turning, the downward pressure on the drill, and the high heat generated by friction.

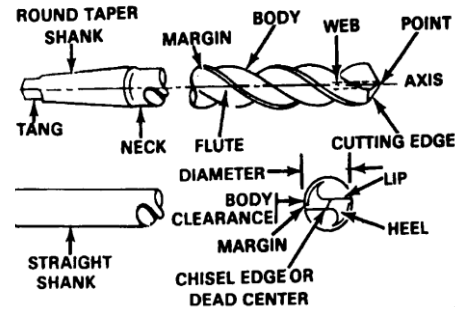


Fig 3: Twist drill

There are two common types of twist drills, high-speed steel drills, and carbide-tipped drills. The most common type used for field and maintenance shop work is the high-speed steel twist drill because of its low cost. Carbide-tipped metal drills are used in production work where the drill must remain sharp for extended periods, such as in a numerically controlled drilling machine. It is important to know the parts of the twist drill for proper identification and sharpening.

The point is the entire conical shaped end of the drill containing the cutting edges and chisel edge. The body is the part of the drill that is fluted and relieved. The shank is the part that fits into the holding device, whether it is a straight shank or a tapered shank. The chisel edge is the point at which the two lips meet. The chisel edge acts as a chisel when the drill is turning and cuts into the workpiece. The chisel edge must always be centered exactly on the drill's axis for accurate cutting action. The heel is the conical shaped portion of the point in back of the cutting edge lips. The amount of slope given to the heel in back of the drill lips is called lip clearance. This clearance is necessary to keep the heel from rubbing the bottom of the hole being drilled. Rubbing would prevent the drill from cutting.

The flute is the helical groove on the drill. It carries out the chips and admits coolant to the cutting edges. The margin is the narrow surface along the flutes that determines the size of the drill and keeps the drill aligned. The portion of the drill body that is relieved behind the margin is known as the body clearance. The diameter of this part is less than that of the margin and provides clearance so that all of the body does not rub against the side of the hole and cause friction. The body clearance also permits passage of lubricants around the drill.

The narrowed end of the tapered shank drill is called the tang. The tang fits the slot in the innermost end of the drill spindle, drill chuck, or other drill holding device and aids in driving the tool. It also prevents the drill from slipping.

The web of the drill is the metal section separating the flutes. It runs the length of the body between the flutes. The web gradually increases in thickness toward the shank, increasing the rigidity of the drill. An imaginary line through the center of the drill from end to end is the axis. The drill must rotate evenly about the axis at all times.

1.4.2 Other Types of Cutters

Drilling machines use cutters that are not drills, to produce special holes. Below are listed the most common types,

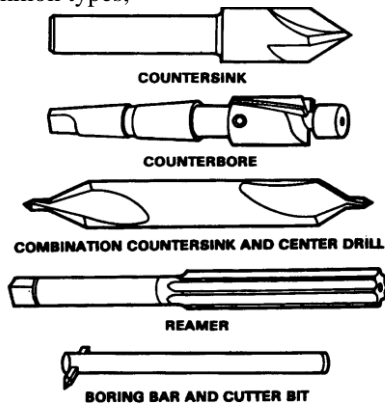


Fig 4: Other Types of Cutters

Countersinks

Countersinks as shown in Fig 1.5 are special angled cutters used to countersink holes for flathead screws so they are flush with the surface when mounted. The most common countersinks are cone shaped with angles of 82°. Cone angles of 60°, 90°, 100°, 110°, and 120° are for special needs.

Counter bores

Counter bores as shown in Fig 1.5 are special cutters that use a pilot to guide the cutting action to enlarge a portion of a hole. Common uses

are for enlarging a hole to make a bolt head fit flush with the surface.

Combined Countersink and Center Drill

This special drilling tool as shown in Fig 1.5 is used to start holes accurately. These tools are mainly used to center drill and countersink the end of round stock in a lathe machine.

Reamers

Reamers as shown in Fig 1.5 are cutting tools that are used to enlarge a drilled hole by a few thousandths of an inch for a precise fit.

Boring Tools

Boring tools as shown in Fig 1.5 are not usually considered with drilling, but they can be used to bore a hole using the power feed drilling machines. These tools consist of an arbor with a tool bit attached that cuts a preset sized hole according to the distance that the tool bit protrudes from the arbor.

Tap and Die Work

Hand tapping and hand die work can be done on a drilling machine. The drill chuck is used to align the tap or die.

1.5 Drill Holding Devices

The revolving vertical spindle of the drilling machine holds and drives the cutting tool. In order to use various sizes and shapes of drills in various machines three types of drill holding devices, which fit the spindle of the drilling machines, are used: the geared drill chuck, the drill sleeve, and the drill socket. The larger drilling machines have a spindle that has a standard Morse taper at the bottom end. There are three types of drill holding devices: the geared drill chuck, the drill sleeve, and the drill socket

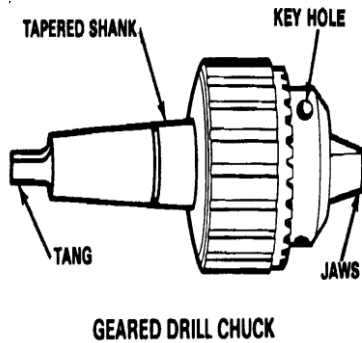


Fig 5: Geared Drill Chuck

1.5.1 Geared Drill Chucks

Drills with straight shanks are held in geared drill chucks which have three adjustable jaws to clamp onto the drill. Smaller size drills are made with straight shanks because of the extra cost of providing these size if tapered.

1.5.2 Drill Sockets and Drill Sleeves

A drill too small for the machine spindle may be fitted into a socket or sleeve which has a taper hole of the proper size to hold the drill and a taper shank of the proper size to fit the drill spindle. Sometimes, more than one socket or sleeve is needed to build up the shank to fit into the drilling machine spindle. Sockets and sleeves may be obtained in a number of different sizes and hole shank taper combinations. Sockets, sleeves, and taper shank drills are mounted into the aligning slots of the spindle and lightly tapped with a soft hammer to seat in place.

1.6 Work Holding and Drilling Devices

Work holding devices are used to hold the work steady for an accurate hole to be drilled, and so a safe drilling operation can be accomplished. Drilling support devices are used to keep the work piece above the worktable or vise surface and to keep the work piece aligned for drilling. Some devices are fairly simple and are used for drilling operations that do not require a perfect hole. Other devices are very intricate and designed for more accurate drilling. Many work holding devices are used with one another to produce the most stable work setup for drilling.

1.6.1 Machine Table Vises

A machine table vise is as shown in Fig 1.7 equipped with jaws which clamp against the work piece, holding it secure. The vise can be bolted to the drilling table or the tail can be swung around to lay against the column to hold itself steady. Below are listed many types of special purpose machine table vises available to machine operators.

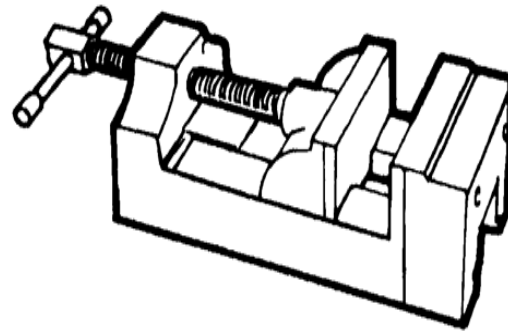


Fig 6: Machine Table Vises

1.7 Laying Out and Mounting Work

1.7.1 Laying Out Work

Laying out work for drilling consists of locating and marking the exact centers of the holes to be drilled. The accuracy of the finished work piece depends, in most part, on the accuracy of the layout. If the work does not require extreme accuracy, then laying out may be a simple operation.

1.7.2 Laying Out Hole Centers

The position of the center of the hole to be drilled is marked by scribing two or more lines which intersect at the hole center. This intersecting point is then marked lightly with a prick punch and hammer. Check to see that the punch mark is exactly at the center of the intersection; use a magnifying glass if necessary. Use a pair of dividers, set to the radius of the hole to be drilled, to scribe a circle on the work piece.

When all scribing is finished, enlarge the prick punch mark with a center punch to aid the center drilling process. Enlarging the mark with a center punch allows the center drill point to enter the work piece easier and cut smoother. Layout of Multiple Holes When more than one hole must be drilled lay out the holes along a common reference line then put in the intersecting lines and scribes the circles.

1.7.3 Mounting Work pieces

Before attempting to use a drilling machine, some provision must be made for holding the work piece rigidly and securely in place. The work piece should always be firmly fastened to the table or base to produce holes that are located accurately. After a work piece is laid out and properly mounted, the drilling process can begin. The drilling process, or complete operation, involves selecting the proper twist drill or cutter for the job, properly installing the drill into the machine spindle, setting the speed and feed, starting the hole on center, and drilling the hole to specifications within the prescribed tolerance. Tolerance is the allowable deviation from standard size.

1.8 Selecting the Drill

Selecting the proper twist drill means getting the right tool for the job. The material to be drilled, the size of that material, and the size of the drilled hole must all be considered when selecting the drill.

1.8.1 Installing the Drill

Before installing the drill into the drilling machine spindle, clean the spindle socket and drill shank of all dirt, chips, and burrs. Use a small file inside the socket to remove any tough burrs.

1.8.2 Selecting Drill Speed

Speed refers to the revolutions per minute (RPM) of the drilling machine spindle. For drilling, the spindle should rotate at a set speed that is selected for the material being drilled. Correct speeds are essential for satisfactory drilling.

1.8.3 Selecting Drill Feed

Feed is the distance a drill travels into the work piece during each revolution of the spindle. It is expressed in thousandths of an inch or in millimeters. Hand-feed drilling machines have the feed regulated by the hand pressure of the operator; thus, the skill of the operator will determine the best feeds for drilling. Power feed drilling machines have the ability to feed the drill into the work at a preset depth of cut per spindle revolution. The selection of the best feed

depends upon the size of the drill, the material to be drilled, and the condition of the drilling machine. Feed should increase as the size of the drill increases. After starting the drill into the work piece by hand, a lever on the power-feed drilling machine can be activated, which will then feed the drill into the work until stopped or disengaged.

1.8.4 Drilling

After the drill has been aligned and the hole started, then insert the proper size drill and continue drilling into the work piece, while applying cutting fluid. The cutting fluid to use will depend on what material is being machined.

1.9 General Materials for Drill Bushes

Drill bushes are made from quality case hardened steel or tool steel. They can also be made of mild steel, which is carburized to give a sufficient case depth. After hardening, the drill bushes are ground, the bore and outside diameter being ground concentric. The bore of the bush is sometimes lapped to give good finish and a fine running fit with the tool.

1.10 Types of Drill Bushes

1. Press fit bushes

- a. Headless or plain bush
- b. Headed or flanged bush
- c. Headed collared press fit bush

2. Renewable bushes

- a. Fixed bushes
- b. Slip bushes
- c. Liner bushes
- d. Threaded bushes
- e. Screw or clamping bush

1.11 Solar Energy

In today's climate of growing energy needs and increasing environmental concern, alternatives to the use of non-renewable and polluting fossil fuels have to be investigated. One such alternative is solar energy. It is quite simply the energy produced directly by the sun and collected elsewhere, normally the Earth. The sun creates its energy through a thermonuclear process that converts about 650, 000, 000 tons of hydrogen to helium every second. The process creates heat and electromagnetic radiation.

The heat remains in the sun and is instrumental in the electromagnetic radiation

(including visible light, infra-red light and ultra-violet Radiation) streams out into space in all directions. Only a very small fraction of the total radiation produced reaches the Earth. Even fossil fuels owe their origins to the sun; they were once living plants and animals whose life was dependent upon the sun.

2. LITERATURE REVIEW

This chapter will cover all the information related to this project, such as die drilling methods and auto feed.

Using this information, the element in the project will be presented to give more understanding about the title, objective, problem statement and the scope of project. The source that may be taken is either from book, journal, patent, conference paper, research paper and website.

1. Prof. P.R. Sawant, Mr.R.A.Barawade Department of Mechanical, R.I.T. Engineering College, Sakharale-415 414, Maharashtra, India

This project discuss the case study and comparison of productivity of component using conventional radial drilling machine and special purpose machine(SPM) for drilling and tapping operation. In this case study, the SPM used for 8 multi drilling operation (7 of Ø6.75 and Ø12), linear tapping operation of Ø12 and angular tapping operation of Ø5.1 of TATA cylinder block with auto feeding. In this paper the following studies are carried out 1. Time saved by component handling (loading and unloading).using clamping, 2. Increase in productivity both qualitative and quantitative, 3. Less human intervention, indirectly Reduction in operator fatigue, 4. Less rejection due to automatic controls, and 5. Increase the profit of company.

2. Basil E. Okafor, Daniel Obiora Isiohia, Department of Mechanical. Engineering, Federal University of Technology, Owerri - Imo State, Nigeria. Department of Mechanical Engineering, Imo State University, Nigeria.

This is an improved design of the manually operated drilling machine commonly used by local metal construction workers. The design ensures a smooth operation during the drilling process, which the shape or length to a required angle drilled. The force is provided by means of a gear assembly, powered by a 2 Horse Power electric motor. It is desired that the pipe material permanently yields under the applied force without breaking since upon removal of the force the material is not expected to recover its original shape (plastic deformation). Thus yield stress

of the range of pipe thicknesses was duly considered in the design.

2.1 Learned and Concluded

From various literature survey efforts to identify in drilling is important processes in the metal industry; the former is flexible in processing whilst the latter is effective in production. By analyzing the various research papers the major problem is the auto feeding. By comparing the various auto feed is economical and environmentally friendly. For achieving the prosperous result of our experimental work and from the literature study of various research papers the project carried drilling operation by using auto feed. Let, we briefly explain about our new project carried out in drilling area.

3. COMPONENTS USED

Main components of auto feed drilling machine as follows,

- Solar panel
- Base
- Vertical support
- Vice and work piece
- Drilling machine
- Drill bit
- Lever

4. COMPONENT DESCRIPTION

4.1 Solar Panel

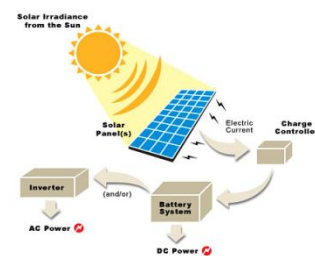


Fig 7: Solar system components

Solar cells (really called “photovoltaic” or “photoelectric” cells) that convert light directly into electricity, bypassing thermodynamic cycles and mechanical generators. PV stands for photo (light) and voltaic (electricity), whereby sunlight photons free electrons from common silicon. A photovoltaic module is composed of individual PV cells.

This crystalline-silicon module has an aluminum frame and glass on the front. In the field of

photovoltaic, a photovoltaic module is a packaged interconnected assembly of photovoltaic cells, also known as solar cells. An installation of photovoltaic modules or panels is known as a photovoltaic array or a solar panel. A photovoltaic installation typically includes an array of photovoltaic modules or panels, an inverter, batteries (for off grid) and interconnection wiring. Solar energy is the utilization of the radiation energy from the sun.

Solar power is used interchangeably with solar energy but refers more specifically to the conversion of sunlight into electricity by photovoltaic and concentrating solar thermal devices, or by one of several experimental technologies such as thermoelectric converters, solar chimneys and solar ponds.

Sunlight is composed of photons, or particles of solar energy. These photons contain various amounts of energy corresponding to the different wavelengths of the solar spectrum.

When photons strike a photovoltaic cell, they may be reflected, pass right through, or be absorbed. Only the absorbed photons provide energy to generate electricity. When enough sunlight (energy) is absorbed by the material (a semiconductor), electrons are dislodged from the material's atoms. Special treatment of the material surface during manufacturing makes the front surface of the cell more receptive to free electrons, so the electrons naturally migrate to the surface.

When the electrons leave their position, holes are formed. When many electrons, each carrying a negative charge, travel toward the front surface of the cell, the resulting imbalance of charge between the cell's front and back surfaces creates voltage potential positive terminals of a battery. When the two surfaces are connected through an external load, electricity flows.

4.1.1 Solar Cell

The photo – voltaic effect can be observed in nature in a variety of materials, but the materials that have shown the best performance in sunlight are the semiconductors as started above. When photons from the sun are absorbed in a semi conductor, they create free electrons with higher energies than the electrons which provide the bonding in the base crystal. Once these electrons are created there must be an electric field to induce these higher energy electrons to flow out of the semi conductor to do useful work. The electric field in most solar cells is

provided by a junction of materials, which have different electrical properties.

4.1.2 Functions of Solar Panel

The solar cells is divided in to p-type and n-type layers, the top layer which is exposed to sunlight acts as a p-type layer and the bottom layer which is not exposed to sunlight acts as a n-type layer.

The two layers are fused together the fused are is known as the junction. Fusing of two layers is known as the semi conductors. The function of the solar cell is as similar to a semi conductor. The positive terminal, which is exposed to sunlight, is p type and the negative terminal is n type. This is known as forward bias. Holes in P layer are repelled by the positive voltage and the electrons in the n-layer are repelled by the negative voltage applied. Therefore the holes and electrons moves towards the junction. Near the junction electron-hole combination takes place.

The electron is liberated from the p-region and enters the terminal. The process continues. Thus a large number of electrons will be flowing from negative to positive terminal. Thus a current is flowing through the junction. The maximum efficiency of 14% is obtained at a temperature of 28 degrees.

4.1.3 Photo Voltaic Effect:

Photo voltaic effect is defined as the generation of an electromotive force as a result of absorption of the ionizing radiation.

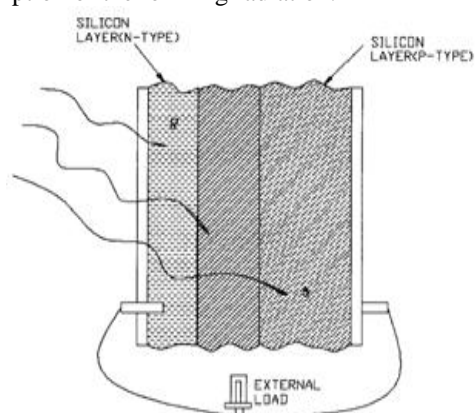


Fig 8: Photo voltaic cell

It is the generation of an electric potential when absorbed radiation ionizes atoms in the vicinity of an electrical potential battery (P-N junction). If the

radiation level is sufficiently separated electron hole pairs (EHP) are created in turn crated an EMF capable of causing a current flow through an electrical load. The incident photon energy must equal or exceed the valance to conduction band gap in order to produce electron hole pairs. In figure, shown how photon of proper wave length creates EHP. These carries in turn migrates to the respective ohmic contact in the n-layer, simultaneously the hole created by photon-electron energy transfer migrates towards the p-layer.

4.1.4 Solar Cell Modules

In actual usage, solar cells are interconnected in a certain series and parallel combinations to form modules. These modules are hermetically sealed for production against corrosion, moisture, pollution and weathering combination of suitable modules constitutes on array. One square meter of fixed array kept facing south yields nearly 0.5 kWh of electrical energy on a normal sunny day if the orientation of the array is adjusted face the sun's ray a anytime, the output can increase by 30% solar PV system can produce on output only if sunlight is present. If it is required to be used during non-sunshine hours suitable system of storage batteries will be required.

There may be tracking arrays or modules or fixed arrays. A tracking array is defined as one, which is always kept mechanically perpendicular to the sun array line so that all times it intercepts the maximum insolation. Such arrays must be physically movable by a suitable prime mover and are generally, considerably more complex than fixed arrays. So we use fixed arrays which usually oriented easy west and tilted up angle approximately equal to the latitude of the site. We kept that 11 degree south facing latitude angle fixed arrays are mechanically simple than tracking arrays. Thus array designs fall into two board classes and thus use design as that of flat plate.

4.1.5 Solar Cell Connecting Arrangement:

Cell may be connected in parallel to achieve the desired voltage. The optimum operating voltage of a photo voltaic cell is generally about 0.45 V at normal temperatures, and the current in full sunlight may be taken 0.270 amperes/sq.mm.

A solar car is a solar vehicle used for land transport. Solar cars are powered by the sun's energy. The main component of a solar car is its solar array,

which collect the energy from the sun and converts it into usable electrical energy. The solar cells collect a portion of the sun's energy and store it into the batteries of the solar car. Before that happens, power trackers converts the energy collected from the solar array to the proper system voltage, so that the batteries and the motor can use it. After the energy is stored in the batteries, it is available for use by the motor & motor controller to drive the car. The motor controller adjusts the amount of energy that flows to the motor to correspond to the throttle. The motor uses that energy to drive the wheels.

Solar cars combine technology typically used in the aerospace, bicycle, alternative energy and automotive industries. The design of a solar vehicle is severely limited by the amount of energy input into the car. Most solar cars have been built for the purpose of solar car races. Solar cars are often fitted with gauges as seen in conventional cars. To keep the car running smoothly, the driver must keep an eye on these gauges to spot possible problems. Cars without gauges almost always feature wireless telemetry, which allows the driver's team to monitor the car's energy consumption, solar energy capture and other parameters and free the driver to concentrate on driving.

Solar cars depend on photovoltaic cells to convert sunlight into electricity. Unlike solar thermal energy which converts solar energy to heat for either household purposes, industrial purposes or to be converted to electricity, PV cells directly convert sunlight into electricity. When sunlight (photons) strikes PV cells, they excite electrons and allow them to flow, creating an electrical current. PV cells are made of semiconductor materials such as silicon and alloys of indium, gallium and nitrogen. Silicon is the most common material used and has an efficiency rate of 15-20%.

The solar array can be mounted in several ways:

- **Horizontal:** This most common arrangement gives most overall power during most of the day in low latitudes or higher latitude summers and offers little interaction with the wind. Horizontal arrays can be integrated or be in the form of a free canopy.
- **Vertical:** This arrangement is sometimes found in free standing or integrated sails to harness wind energy. Useful solar power is limited to mornings, evenings, or winters and when the vehicle is pointing in the right direction.
- **Adjustable:** Free solar arrays can often be tilted around the axis of travel in order to increase power when the sun is low and well to the side. An alternative is to tilt the whole vehicle when parked.

Two-axis adjustment is only found on marine vehicles, where the aerodynamic resistance is of less importance than with road vehicles.

- **Integrated:** Some vehicles cover every available surface with solar cells. Some of the cells will be at an optimal angle whereas others will be shaded.

- **Trailer:** Solar trailers are especially useful for retrofitting existing vehicles with little stability, e.g. bicycles. Some trailers also include the batteries and others also the drive motor.

- **Remote:** By mounting the solar array at a stationary location instead of the vehicle, power can be maximized and resistance minimized. The virtual grid-connection however involves more electrical losses than with true solar vehicles and the battery must be larger.

The choice of solar array geometry involves an optimization between power output, aerodynamic resistance and vehicle mass, as well as practical considerations. For example, a free horizontal canopy gives 2-3 times the surface area of a vehicle with integrated cells but offers better cooling of the cells and shading of the riders. There are also thin flexible solar arrays in development.

Solar arrays on solar cars are mounted and encapsulated very differently from stationary solar arrays. Solar arrays on solar cars are usually mounted using industrial grade double-sided adhesive tape right onto the car's body. The arrays are encapsulated using thin layers of Teller.

Some solar cars use gallium arsenide solar cells, with efficiencies around thirty percent. Other solar cars use silicon solar cells, with efficiencies around twenty percent.

4.2 Base

Provides a heavy rigid frame on which all the main components are mounted. It is a fixed frame structure. This is used to carry the pneumatic components, supports and other drilling machine setup components.

4.3 Vertical support

The column or vertical support is cylindrical in shape and built rugged and solid. The column supports the head and the sleeve or quill assembly. The vertical support is held on base support and it never takes any movements. It's used to hold the cylinder setup for make the drilling operations.

4.4 Drilling machine

Drilling machine is the component in which its carry the drill bit to make or carry a drilling process.

The bottom end carries the drill bit and the other end is mounted on a ram of a pneumatic cylinder. Inside the drilling machine having a motor setup which is use to drive a spindle of a drill bit.

4.5 Drill bit

The spindle holds the drill or cutting tools and revolves in a fixed position in a sleeve. The drill bit or cutting tool is used to removing a material from work piece.

4.6 Vice and work piece

A vice is a work holding device. This is rigidly placed on a base as well as straight to drilling machine. The work piece is a part being machined. The work piece either may be a metal or wood or some other material according to our process. The work piece is tightened in vice.

5. WORKING PRINCIPLE

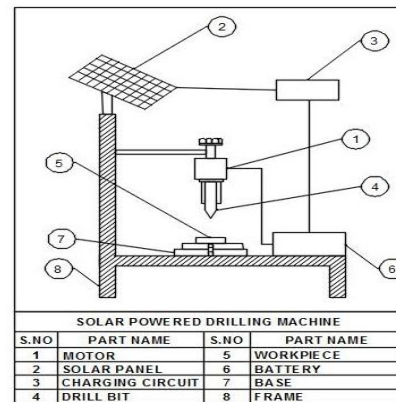


Fig 9: Pneumatic Automatic Feed Drilling Machine

- For a developing industry the operation performed and the parts (or) components produced should have it minimum possible production cost, then only industry runs profitability.
- In small-scale industry and automobile maintenance shops, there are frequent needs of tightening and loosening of screws, drilling,

boring, grinding. Further for every operation separate machine is required.

- This increases the initial cost required, large area requirements and large number of machines is required. In our project the above complicated are rectified.
- The compressed air from the compressor is used as the force medium for this operation.
- There are two pneumatic cylinder used. One is used for auto feeding mechanism and another one cylinder for work piece clamping.
- The pneumatic double acting cylinder is used for feeding mechanism. The air from the compressor enters to the four way junction. From four way junctions one way of air enters to the barrel unit.
- Inside the barrel having vane arrangement is welded. The other way of air enters to the 5/2 solenoid valve. The function of solenoid valves all of air correct time interval.
- From solenoid valve air enters to the pneumatic double acting cylinder through flow control valve.

6. ADVANTAGES AND APPLICATIONS

6.1 Advantages

- It reduces the manual work.
- Quick operation
- Accuracy is more
- Low cost machine
- Solar power is also not cost

6.2 Applications

- Used automobile workshops like carburetor holes
- Used small scale industries
- In welding shop for grinding
- For performing the operations in huge part which cannot be done in ordinary machines. Since it's portable.
- In such places where frequent change in operation are required.

6. CONCLUSION

This report details with design and "SOLAR OPERATED DRILLING MACHINE". The project carried out by us made an impressive task in the shaping works of inclined work piece. It is very useful for the labors to make a hole for inclined profile component of required length to perform the milling operations to be carried out.

This project has been designed to perform the entire requirement task, which has also been provided. This type of fixture is mainly used in production field for drilling the cylindrical rod firmly and securely to perform operations and is mainly used in manufacturing - oriented industries.

REFERENCES

- [1] Machine tools and tool design by P.C. Charma published by S.Chand and company
- [2] Design of jigs, fixtures and press tools by C.Elanchezhian, T.Sunder selwyn, B.vijaya Ramnath Published by Eswar press.
- [3] Design of jigs, fixtures and press tools by Venkataraman published by Tata McGraw hill