

Portable Multipurpose Parabolic Solar Dryer

Thirumaran.V, R.Vignesh, G.Vicky
Assistant Professor, Student, Student
IFET College Of Engineering

Abstract - This solar dryer using concentrating collector, heat from the sun is concentrated on a black copper vessel located at the focus point of the reflector is used for collecting the heat for drying the graphs, cloth and other food materials in short time period. It also describes the sun tracking system unit by manual tilting of the lever at the base of the parabolic dish to capture heat energy. The whole arrangement is connected with the two ends of the parabolic dish and that can be adjustable so the sun reflection always pointed toward the bottom of the collector by adjusting that setup based on the time and position of the sun. On the average sunny and cloud free days, the test results gave high temperature above 200°C.

Keywords - Solar Energy, Sun, Heat, Steam, Water, Radiation, Temperature.

INTRODUCTION

1.1 SUN AND ITS ENERGY

The solar energy is available at anytime, the sun readily comes to mind, so it is justifiable to discuss in brief the physical and chemical behaviours of radiation from heat energy before its application to heating. The sun has structure and characteristics, which determine the nature of the energy it radiates into space. The sun is sphere of intensely hot gaseous matter with a diameter of 1.39×10^6 km and is on the average 1.5×10^8 km from the earth. The surface of the sun is at an effective temperature of about 5762K (5489°C). The temperature in the central interior regions is estimated at between 8×10^6 K to 40×10^6 K and the density about 80 to 100 times that of water. The fusion reactions which is suggested to supply the energy radiated by the sun is several, the one considered most important is a process in which hydrogen combines to form helium.

1.2 HELIOSTAT AND ITS USES

The intensity of solar radiation on a surface normal to the sun's rays beyond the earth's atmosphere at the mean earth-sun distance is defined as the solar constant I_{sc} . Although there are recurrent small variations in the sun's radiant output caused primarily by periodic changes in the ultraviolet portion of the solar spectrum, the currently accepted value is 4353 w/m^2 .

Despite the variations, solar energy can be used in three processes:

Helio thermal- this is the system in which the incident radiation is absorbed and turned into heat.

Helio chemical- In which radiation between 0.3 and $1.0 \mu\text{m}$ can cause chemical reactions, sustain growth of plants and animals and through photosynthesis convert exhaled carbon dioxide to breakable oxygen.

Helio electrical – In which part of the radiation in the band between 0.33 and $1.2 \mu\text{m}$ can be converted directly into electricity by photovoltaic cells.

The incoming solar radiation suffers depletion in the following ways:

Absorption by the ozone in the upper atmosphere.

Scattering by dry air.

Absorption, scattering and diffuse reflection by suspended solid particles.

Absorption and scattering by thin cloud layers.

Absorption and scattering by water vapour.

1.3 DEMAND OF FOSSIL FUEL

In order to Fossil fuel depletion and global warming problem lead our society to the use of clean and abundant energy sources. Renewable energy sources are sustainable by producing zero greenhouse gas emissions and will be always available, so they seem to be the most suitable energy sources for the future. Solar energy is the oldest energy source ever used and is widely used by giving solutions in many applications, from industrial hot water supply to electricity production, especially in countries with a high solar irradiation level as Green. More specifically, concentrated solar collectors are able to produce high temperatures (over 400 °C) with high thermal efficiency. This is the fact that makes them a feasible and promising technology for solar desalination, solar chemistry applications, solar cooling, solar hydrogen production

LITERATURE SURVEY

1. SOLAR THERMAL POWERED ORGANIC RANKINE CYCLES

M. Orosz, R. Dickes, A parabolic dish reflector (PDR) is a point-focus system with a parabolic geometry given by the revolution of one half of a parabola around its normal axis. Sunlight entering the collector aperture with a normal incidence is concentrated onto a heat receiver located at the focal point of the dish.

2. PARABOLIC DISH CONCENTRATING SOLAR POWER (CSP) SYTEMS

W. Schiel, T. Keck, The parabolic dish concentrator development over the last 25 years has demonstrated an impressive diversity of designs and solutions. While many systems apply a Stirling engine as a PCU, others generate heat to be supplied by other thermodynamic cycles. Two-axis solar concentration allows for high upper process temperatures and the highest conversion efficiencies of all solar concentrate ing technologies.

3. SOLAR COOKER

Heat from sun's rays can be harnessed to provide heat to a variety of applications such as cooking, air conditioning and generating electricity. But in general, Sun's rays are too diffuse to be of direct use in these applications. So solar concentrators are used to collect and concentrate sun's rays to heat up a working fluid to the required temperature

4. THERMAL AND OPTICAL EFFICIENCY INVESTIGATION OF A PARABOLIC TROUGH COLLECTOR

C. TzivanidisG. Mitsopoulos Solar energy utilization is a promising Renewable Energy source for covering a variety of energy needs of our society. This study presents the most well-known solar concentrating system, the parabolic trough collector, which is operating efficiently in high temperatures. The simulation tool of this analysis is the commercial software Solid works which simulates complicated problems with an easy way using the finite elements method.

5. SOLAR PYROLYSIS

M.U.H.Joardder, M.H.Masud Parabolic-dish solar concentrators are two-axis solar tracking systems that concentrate the solar radiations toward the thermal receiver located on the focal point of the dish collector, which is operating efficiently in high temperatures. The simulation tool of this analysis is the commercial software Solid works which simulates complicated problems with an easy way using the finite elements method.

6. TRADITIONAL SOLAR DESALINATION UNITS

Hongfei Zheng, Concentrating type passive solar stills generally are coupled with a parabolic dish, parabolic trough concentrator, or planar reflector. Because a single parabolic dish concentrator is limited by the dish area so that a single unit is not so big, the solar still coupled with a parabolic dish concentrator is not so popular. A large-scale planar reflection collector needs a center receiving tower. Therefore it is not suitable to be used together with passive solar stills. The left one, a parabolic trough solar concentrator, is the only one easy to be coupled with a passive solar still. Certainly, it not only can be combined with an active solar still, but also with a passive solar still.

BLOCK DIAGRAM

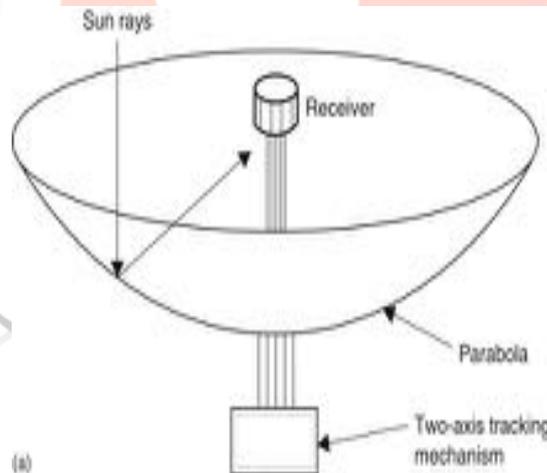


FIG SHOWS THE BLOCK DIAGRAM

DESIGN DIAGRAM



PHOTOCOPY



PHOTOCOPY OF THE PROJECT
TEMPERATURE READINGS BAR DIAGRAM

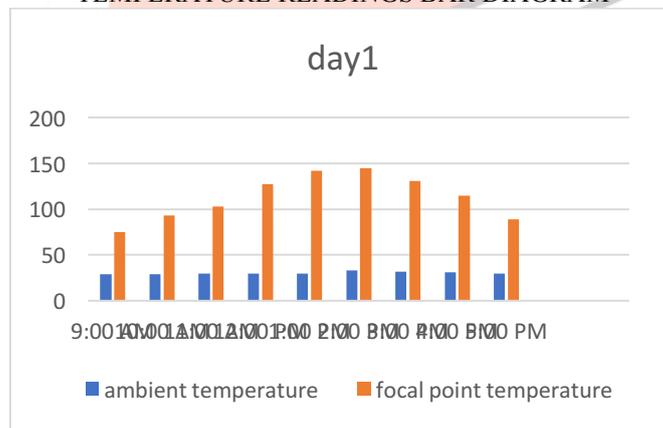


Fig 11.1 temperature variation in day 1

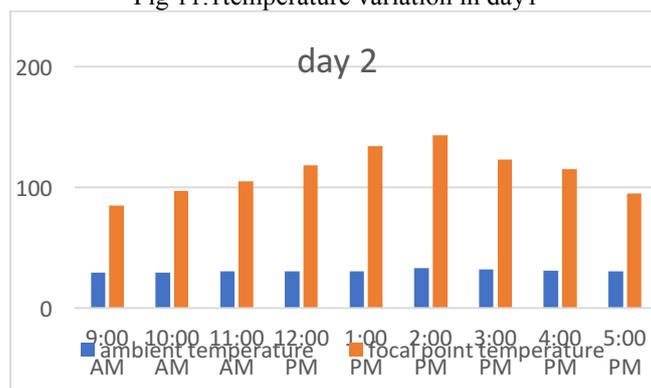


Fig 11.2 temperature variation

CONCLUSION

Here we done this project for solving the problems faced in day to day life due to the lack of fossil fuel availability, it is mainly used for reducing the time period and the fossil fuels required for drying the things like useful food products and the agricultural products there is copper vessel is used for collecting the heat energy reflected from the dish so the surface temperature of the vessel is increase due to high thermal conductivity of copper so drying the things using this project is very effectively as well as very quickly. by using this method we can obtain the surface temperature of near to 190°C for the ambient temperature of 38°C.

REFERENCES

- [1] Duffie J.A. and Beckman.W., Solar energy Thermal Processes. John Wiley, New York, 1974
- [2] Garg.H.P. Advances in Solar Energy Technology, Vol. 3 chapter 1, D. Reidel Publishing Co., Holland, 1987.
- [3] Ezeilo.C.C.O."Sun Tables and Charts for Nigerian Institutes" Presented to National Solar Energy Forum. The Federal Polytechnic, Bida, Niger state, April 27-30, 1983.
- [4] El-Wakil M.M., Power Plant Technology International Edition, McGraw-Hill Book Company, New York, 1984.
- [5] Ojo O., Fundamentals of physics and dynamic climatology 1st edition SEDEC publishers, Lagos, 2001.
- [6] Romm E.,World Energy Consumption The Energy Journal, Vol.54, PP13.,2001.
- [7] Sukhtame S.P., Solar Energy Principle of Thermal Collection. Tat Mc Graw- Hill Book Company, New York, 1984.
- [8] John W.T.and AnthonyD.W, Renewable Energy Resources. English Language Book Sociesty, 1986.
- [9] Kreider J.F and Kreith F.,Solar Energy Handbook Mc-Graw Hill Book Company, New York,1980.
- [10] Awachie.I.R.N. "Design Features and Test Result of a Solar Hot Box", NJSE 2(1), 74-80, 1982.

