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# Performance Analysis of Solar Air Dryer

Naveen M.N<sup>1</sup>, Abijith C<sup>1</sup>, Aravind S<sup>1</sup>, Gagan S<sup>1</sup>, Hemanth Kumar N<sup>2</sup>

Assistant Professor, Department of Mechanical Engineering, Adhiyamaan Engineering College, Hosur,  
Tamilnadu, India<sup>1</sup>

U.G Students, Department of Mechanical Engineering, Adhiyamaan Engineering College, Hosur, Tamilnadu, India<sup>2</sup>

**ABSTRACT:** The technology of solar energy power conversion has gained its importance in industries, agriculture as well as domestic purpose. Therefore, it is important for technician and engineers to have a good knowledge on solar power, its generation and its utilization. The solar energy received in the form of solar radiation (diffuse or beam radiation) is converted by direct or indirect energy conversation method. In this project, solar power is absorbed in sheet metal which is used for drying of vegetables and fruits. A natural convection solar drier is used to test the performance of drying chili under metrological condition

**KEYWORDS:** 2D diagram, Graph, result.

## I. INTRODUCTION

The sun creates its energy through a thermonuclear process that converts about 650000000 tons of hydrogen and helium release every second. These processes create the heat and electromagnetic radiation. Solar energy is radiant light and heat from the sun harnessed using a range of ever-evolving technologies and it is an important source of renewable energy which is one of the cleanest energy sources available in the earth. Solar dryer uses the sun as direct source of energy to dry the crops rapidly. In direct solar dryer, the agricultural product is dried by placing the products under the glass plate which is directly exposed to sunlight but it has several disadvantages. The disadvantages of this type is to overcome by the indirect type forced convection solar dryer. In indirect solar dryer, the black surface heats incoming air, rather than directly heating the substance to be dried. This heated air is then passed over the substance and exits through a chimney, taking moisture from the substance

## TABULATION

Time	Temperature						Solar Radiation	Efficiency
	T <sub>1</sub>	T <sub>2</sub>	T <sub>3</sub>	T <sub>4</sub>	T <sub>5</sub>	T <sub>6</sub>		
	K	K	K	K	K	K	W/M <sup>2</sup> K	%
10.30	322	318	305	302	315	306	700	49
11.00	317	315	302	303	313	306	760	48.5
11.30	324	320	300	304	314	306	820	48
12.00	324	318	304	306	317	306	900	47
12.30	324	319	298	300	313	306	1049	45
13.00	334	328	298	300	315	307	1056	45.5
13.30	314	311	298	305	312	307	920	42
14.00	315	311	299	305	312	306	860	44

## TOOLS

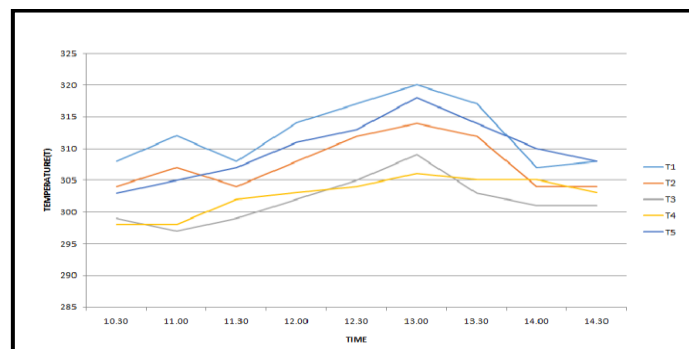
- Pyranometer
- Anemometer
- Hygrometer
- Thermos couples

## II. METHODOLOGY

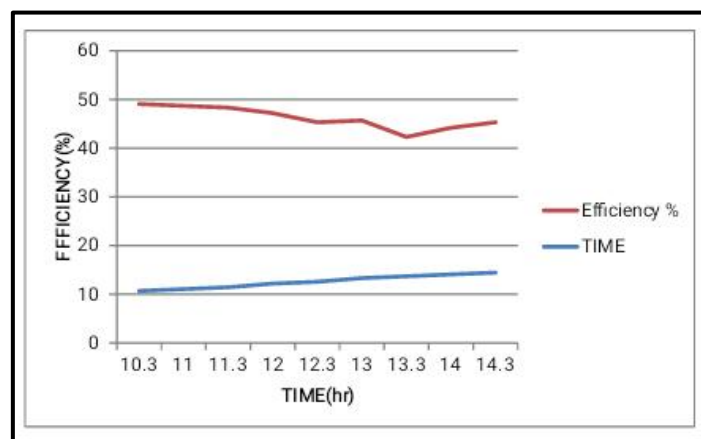
The figure 66 shows experimental setup consists of a solar flat plate collector made up of galvanized iron sheet metal, air blower with 0.5 hp motor at 850 rpm and drying chamber the system run with forced convection process where the air is circulated inside the tube with flow rate of 0.8 m/s which absorbs heat from the corrugated roof sheet with tube boned with it and finally passed to drying chamber. This hot air is used to dry mint leaves under climatic condition present in top flow in Adhiyamaan College of Engineering Hosur. The temperature at inlet, outlet, inlet to drying chamber and ambient temperature are measured by K type thermocouple. The solar collector is placed north-south facing in top floor in Adhiyamaan College of Engineering in Mechanical Department Hosur. The incident solar radiation is measured by solar meter, wind velocity is measure by anemometer, relative humidity is measure by hygrometer and the parameters are measured value is taken for 30 minutes duration

### GRAPH

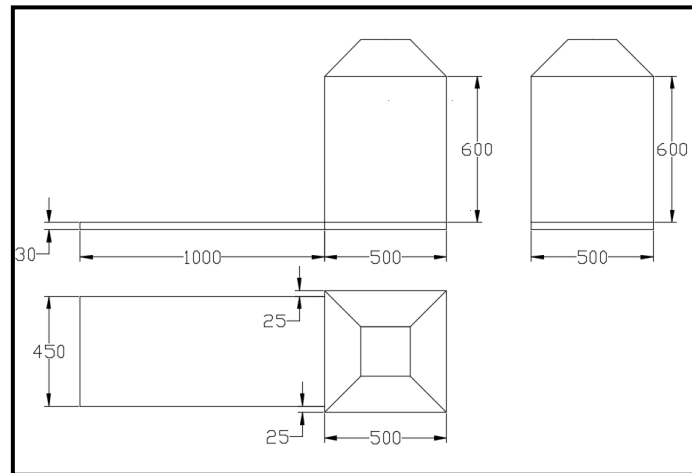
**FIGURE1: Time Vs Temperature**



**FIGURE2: Time Vs Efficiency**



**FIGURE3:2D DIAGRAM**



#### IV. EXPERIMENTAL RESULTS

The schematic Diagram of Solar Dryer of corrugated roof sheet solar air dryer is tested in outdoor condition as shown in figure. The serpentine type of collector used to conduct experiment to find the efficiency of the collector. It consist of cover, absorber with corrugated sheet which is black painted for higher absorption properties and insulated.

#### V. CONCLUSION

The fabricated solar air dryer was tested and experiment was conducted for 2 days. It can be observed that collector efficiency strongly depends on solar radiation. As natural convection raw material weighed 250 grams after experiment conducted it weighed 68 grams. While forced convection raw material weighed 250 grams after experiment conducted weighed 40 grams. As a result forced convection is more efficient than natural convection Thus it can be concluded that solar is most appropriate for drying system. This project is most useful for drying applications (vegetables, non-vegetables, medical plants, etc.).

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 **9940 572 462**  **6381 907 438**  **ijirset@gmail.com**



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