

# अनुसंधान

## Science Technology & Management Journal

Celebrating  
Five Years of Meaningful  
Research Publication



**A better tomorrow for every one through Research & Innovation**



Mangalyaan - India



Tejas Jet - India



Solar Road-France



Hi-Tech Robot-Japan



First 3D Printer-USA



Driverless Car-Germany



AISECT University: Village- Mandua, Post-Bhojpur, Distt - Raisen (M.P.)  
India Pin-464993 Ph-0755-6766100, 07480-295707

e-Mail [aisectjournal@rediffmail.com](mailto:aisectjournal@rediffmail.com), [info@aisectuniversity.ac.in](mailto:info@aisectuniversity.ac.in)  
Web site : [www.aisectuniversity.ac.in](http://www.aisectuniversity.ac.in)

## Anusandhan (AUJ-AN)

- Technology & Management

Indexing and Impact Factor :

**INDEX COPERNICUS : 48609 (2018)**

[Read / Download More Articles](#)

## Innovative Multipurpose Solar Air Heater Design

**Dr. Alok Kumar Rohit**

Associate Prof., Dept. of ME, AISECT University, Bhopal (M.P.) India.

**ABSTRACT**

The suitable design is the most important key to a cost-effective solar air heater. Although, there are many techniques that have been proposed to improve the solar air heaters performance by means of different turbulence promoters, there is need for a cost effective and efficient heater. The aim of this study is to find simple and tolerable solution to get rid of the inconvenience resulting from the widely adopted heat transfer enhancement techniques by providing an optimized solar air heater design. Proposed design has been quite and efficient with potential for multiple applications. This project consists of new design that will fulfil the necessary energy requirements.

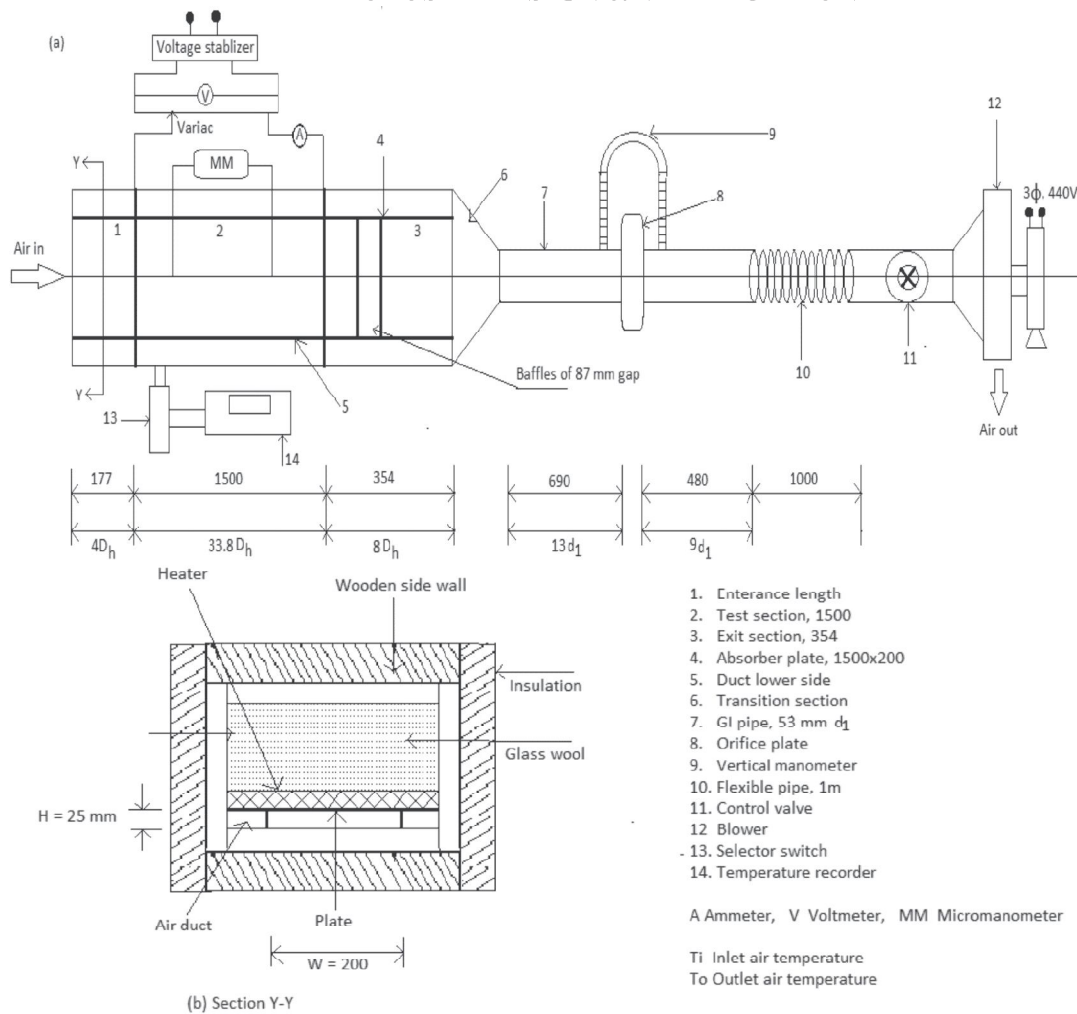
**I OBJECTIVE OF PROJECT**

(a) The aim of this project is to design and install a more enhanced form of solar air heater. The efficiency of proposed experimental setup is expected to much higher as compare to

conventional ones. Many researchers have been investigated on different setup.

(b) Design a heater system for multiple applications for agriculture, hospital, mining and military application.

**II PROPOSED DESIGN & VERIFICATION**



**Fig. 1 (a) Conventional System**

The collector is to be mounted on the south oriented face at ground surface in a way to work constantly.

The collector will perform through natural convection. Various characteristic have been studied theoretically, using and original computer algorithm. Performance results evaluated and investigated with the relationship of the constructional factor and their influence on the overall collector efficiency has been quite good.

The Conventional set up shown at fig. 1 (a) is modified with heater design as heater design as shown in fig 1 (b) to reduce losses. Various heat

losses like conduction and convection have been reduced a very large extent.

The performance has been evaluated in terms of thermal and effective efficiency for various mass flow rates. The overall efficiency of proposed solar air heater is considerably higher in comparison with the efficiency range of the conventional smooth flat plate heaters.

The proposed design consist triangular duct type solar air heaters. The absorber plate one will locate at horizontal position and another two absorber plate will be located at such a place where it gets tilted with certain angle.

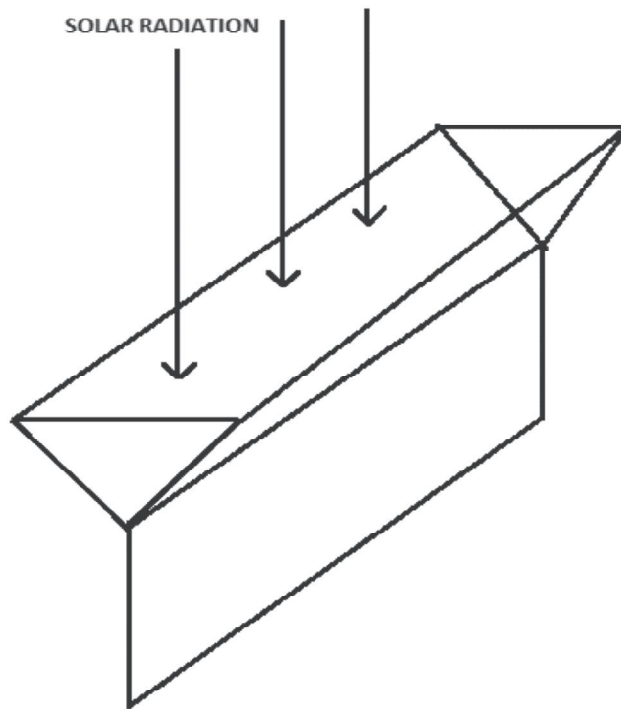


Fig 1 (b) Proposed Collector for better efficiency

### III LIST OF MATERIALS FOR EXPERIMENTAL SET UP

The proposed design required items listed at Table 1.

The construction was possible in the workshop of the university

**Table 1**  
**Items used in the configuration**

S.No	Name of equipment	Specification	Quantity	Tentative Price
1	Centrifugal Compressor	-	1 Nos.	30000
2	Digital manometer	-	1 Nos.	150000
3	Digital DC microvolt meter	-	1 Nos.	2000
4	Heater	1500 W	3 Nos.	30000
5	Selector Switch	-	1 Nos.	5000
6	GI Sheet	-	40 Nos.	12000
7	Wood for Structure	100 feet	-	20000
8	Thermocouples	-	100 Nos.	1000
9	Mercury	500 gm	3 pack	3000
10	GI Pipes	5 cm dia.	5 m	1000
11	Glass Sheet	216mm x 1500mm	3 Nos.	1500
12	Flexible Pipes	5 m	1 Nos.	200
13	Insulator	8" x 4"	2 Nos.	2000
14	Aluminium Sheet	8 " x 4"	2 Nos.	4000
15	MS Pipes	20 m	-	5000
16	Rotameter	-	1	10000
17	Labour Cost	-	-	50000
18	10 A Single phase variable auto transformer	10 mA-2A/50 mA- 5 A/0.1-10 A	-	4000
19	Volt meter & Ammeter	-	-	1000
20	Contingency	Nil	Nil	50000
TOTAL AMOUNT				3,81,700

#### IV APPLICATIONS

- (a) Crop drying: grains, fruits, vegetables, meat.
- (b) Drying minerals, coal, paper, bricks. Especially the drying of brown coal would be very important for power plant.
- (c) Commercial and Industrial uses like Warehouse, Factories and Distribution.
- (d) In Hospital, Recreation centre, Apartments and Schools.
- (e) Sewage treatment plant, Courthouses and Vehicle maintenance garages.
- (f) In Military like Aircraft hangers and Vehicle garages.
- (g) Animal shelter and Poultry coups.
- (h) Space heating
- (i) Heat exchanger
- (j) Air pre-heater or combustion chamber.