Build and fabricate an efficient solar energy cloth dryer

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ABSTRACT

Nowadays, a lot of houses use electric energy as a type of source to dry clothes but we know the home dryer uses more electricity to transform this energy to heat, so the main purpose of this project is to study and fabricate an air solar collector and the distribution of the heat induced from the solar energy into a closet where the heat is used to dry wet clothes. This contributes to minimizing the cost of electricity consumption. The project started by considering the use of solar energy to operate a hung cloth dryer and then fabricating the dryer with different adjustments. The fabricated design requirements need to be known for many items such as the air solar collector, closet, mechanical system configuration (motor, drum, pulleys, etc.), and energy analysis. The experimental part shows the amount of heat produced by the solar collector, heat loss in the ducts, shorten the time taken for the clothes to be completely dry. The project will then proceed to the detailed design work involving the production of device drawings from SOLIDWORKS. The best and least expensive materials will be

PROBLEM STATMENT

In some countries in the Middle East, people are used to hanging their clothes under the sunlight over the house or outside the house, and some clothes are affected by the powerful radiations of sunlight that due to the effect of UV (Ultraviolet) rays harm clothes, and clothes are exposed to climatic conditions such as rain and dust. Electrically powered dryers consume a lot of electricity to dry clothes. This project will contribute in solving the mentioned problems by using renewable energy such as solar energy. The idea of this project turned to be environmentally friendly through the use of solar energy as an energy source for drying, and this project develops a solar-powered clothes dryer instead of natural drying that is exposed to UV (Ultraviolet) rays, and electric drying that consumes a large amount of electricity.

PROJECT OBJECTIVES

The main objectives of this project is to use the solar energy to transform this energy to be use in clothes drying process and reduce the cost of electrical energy.

The main takes of this project are:

(i) To design clothes drying system that uses solar energy as the source of heat.

(ii) Perform some experiments to see the quantity and efficiency of this device.

Design

Fig1 : Real Device

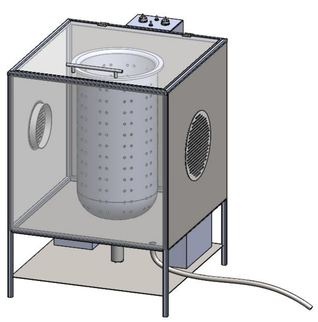

Fig2 : Device From Solidworks

EXPERIMENT

In this project, many experiments were performed on the fabricated dryer and The experiments are as follows

1- Study of mass of clothes with 50% wet versus time

2- Study of the amount of discharge water with time for 100% wet clothes. and both experiments include 3 types of drums

Fig3 : Original drum with circular hole

Fig4 : Traditional drum with circular hole

Fig5 : Complex traditional drum with oval and circular hole

Time (min)	Mass (g)	Efficacy (%)
0	4067	-
5	1898	74.89
10	1770	79.31
15	1766	79.45

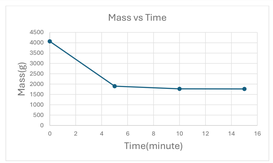

Fig6 : Result ex1 first drum

Time (min)	Mass (g)	Efficacy (%)
0	4067	-
5	1755	79.83
10	1743	80.25
15	1735	80.52

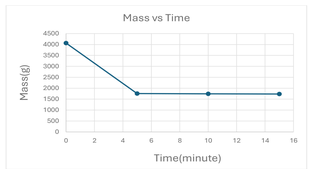

Fig7 : Result ex1 second drum

Time (min)	Mass (g)	Efficacy (%)
0	4067	-
5	1865	76
10	1788	78.69
15	1759	79.69

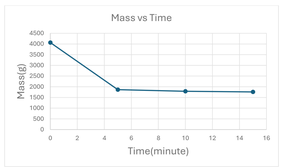

Fig8 : Result ex1 third drum

Time (min)	Discharge (g)	Percentage (%)
1	1900	52.66
2	2100	58.2
3	2250	62.36
4	2262	62.69
5	2342	64.91
6	2385	66.1
7	2385	66.1
8	2413	66.87
9	2423	67.16
10	2429	67.32

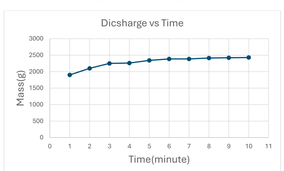

Fig9 : Result ex2 first drum

Time (min)	Discharge (g)	Percentage (%)
1	1912	52.99
2	2227	61.72
3	2571	71.26
4	2661	73.75
5	2721	75.41
6	2749	76.19
7	2775	76.91
8	2775	76.91
9	2777	76.97
10	2825	78.29

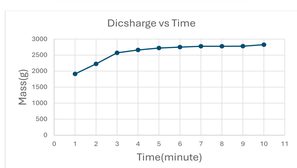

Fig10 : Result ex2 second drum

Time (min)	Discharge (g)	Percentage (%)
1	710	19.68
2	1100	30.48
3	1800	49.88
4	1992	55.2
5	2342	64.91
6	2412	66.85
7	2442	67.68
8	2483	68.81
9	2487	68.9
10	2488	68.95

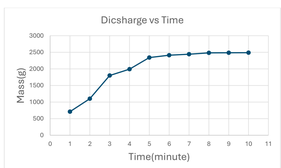

Fig11 : Result ex2 third drum

CONCLUSION

In this project, a solar energy clothes dryer was fabricated and tested. Many experiments were performed to assess this device. These experiments are:

- First experiment is to see the relations between time and mass of clothes with 50% wet clothes with three types of drum were used.
- Calculate of the dryer efficiency for all drums are obtained.
- Raking of these drums from the point view of drying time were provided in this study.
- Second experiment is to see the relation between discharge of water with time for three drums and calculate the efficiency for each drum.
- The best drying time of drum good is the traditional drum with circular hole.

Interesting conclusions were obtained from this project were:

- Drying time were minimum in experiment 1 which is original drum shown Fig 4.1
- Discharge water versus time in experiment 2 indicate that the tradition drum traditional drum with circular hole shown Fig 4.2 is the best in water discharging. Finally, the project shows that by using simple and not costly device one can get an acceptable drying time of wet clothes. Using this system may require less maintenance and therefore easy to use and operate.

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