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REFRIGERATION SYSTEM USING WITH DESICCANT MATERIAL

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ABSTRACT:
Desiccant refrigerate system has been considered as a productive method of controlling moisture content in supply air. No ozone-depleting and coolants are used also it consumes less energy as compared to the vapour compression systems. This piece of information provides an extensive review of Desiccant systems. The above components of Desiccant cooling systems such as dehumidifier, packing materials, and desiccant properties of solid desiccant materials are discussed further.

Keywords- Refrigeration and air conditioning, Desiccant, Humidity control, Heat transfer, Dehumidifier.

i. INTRODUCTION

Desiccant refrigerate systems are heat-driven cooling units which can be used as an alternative option to the conventional vapour compression as well as absorption cooling systems. Its function is based on the usage of a rotary dehumidifier a desiccant in which the air is dehumidified. The resulting dry air is cooled to some extent in a sensible heat exchanger rotary, and further on cooled by an evaporative cooler. The final out coming cool air is directed into the room. The system may be operated in either a closed cycle or more commonly in an open cycle in the ventilation or recirculation modes.

ii. SCOPE OF WORK

Food processing industries, chemical industries etc.

It is also used in domestic purpose to control temperature as well as humidity.

iii. METHODOLOGY

It is a process for implementation and development of the project. The goal and the success of the project are dependent on how the plans are conducted to achieve the final outcome. Methodology is used to describe stepwise accomplishment of the sequence of flow work from the beginning till final success and outcome is achieved. All the results obtained were evaluated and improved until the best result to be selected came out. This implementation would help bring out the worst results where try and error occurs. Where any ideal decision may be reconsidered and repeated until to satisfy the best outcome.

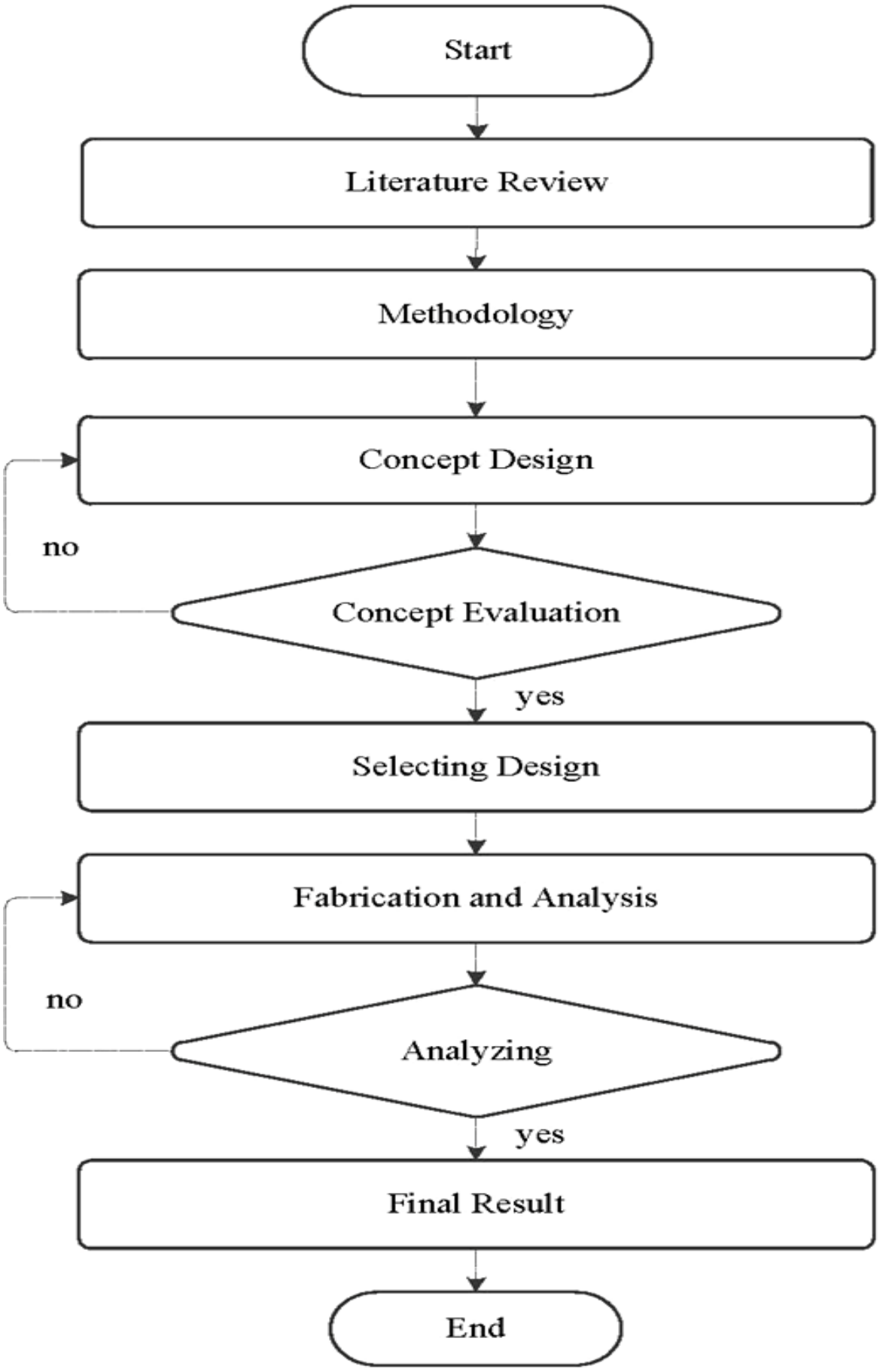

Fig. 1 Flow chart of Desiccant cooling system.

iv. Research

In this section, there consists of three element input that can be used to conduct the project research. Where methods to be conducted for each of the element is unique.

Research through the website is the best alternative in which more information can be obtained and collected. In addition, information regarding the completion date and last well-known venue can also be told. There are a number of books that are related with the research objectives which can be used even as a guide for completing the report and the fabrication process. Also for validity, the journals related to it can also be downloaded and taken as a reference report. There are many websites that access supply for further information in respect to the project problems and how to overcome them can also be found out.

v. DESIGN

- **MOTOR**

Electrical motors are commonly used everywhere. Almost all the electro-mechanical movements we observe are caused either by an A.C. or a DC motor. Now, we will examine this types of motors, which is converts DC electrical energy into a mechanical energy.

DC or direct current motor works on the principal that when a current carrying conductor is placed in a magnetic field, it experiences a torque and has a tendency to move. This is known as motoring action. If the direction of current in the wire is reversed, the direction of rotation also gets reversed. While magnetic field and electrical field to act upon one another they generate a mechanical force, so as a result on that the working principle of DC motor is established.

- **SHAFT**

The shaft is a mechanical component that can be used for transmitting torque and rotation, is usually used to connect other components of a drive train that cannot be connected directly because of distance between them or require to allocate for relative movement between them.

The drive shafts are subjected to torsion and shear stress and are equivalent to the difference between input torque and the load. Therefore they must be strong enough to bear the stresses, while avoiding too much additional weight as that would in turn increase their inertia.

Also, it allows for the variations in the alignment and distance between the driving and driven components. Drive shafts frequently incorporate one or more jaw couplings, universal joints or rag joints, and sometimes a splined joint or prismatic joint.

vi. DESIGN CALCULATIONS

- **MOTOR SELECTION**

For our project we are using 0.15 HP MOTOR.
0.15 HP = 111.85 WATTS
RPM of motor = 30

We know that
$P = 2 \times \pi \times N \times T / (60)$
$111.85 = 2 \times \pi \times 30 \times T / (60)$
T = 35.62 N.mtr
T = 35621 N.mm

- **DESIGN OF SHAFT**

Now, We know torque is 25621 N
Shaft Dia = ds
Now,
Torque Transmitted to the Shaft
$T = \pi/16 \times (ds)^3 \times \tau_{ms}$
$35621 = \pi/16 \times (ds)^3 \times 35$
$(ds)^3 = 5185.95$
ds = 17.30 mm
We are selecting Diameter of Shaft 20 mm

vii. RESULT

We designed and built our model to work perfeclty under all conditions. The results below are listed.

Fig. 2 Figure of experiment

ALMOST 10% HUMIDITY DECREASES WITH THE HELP OF SILICA.

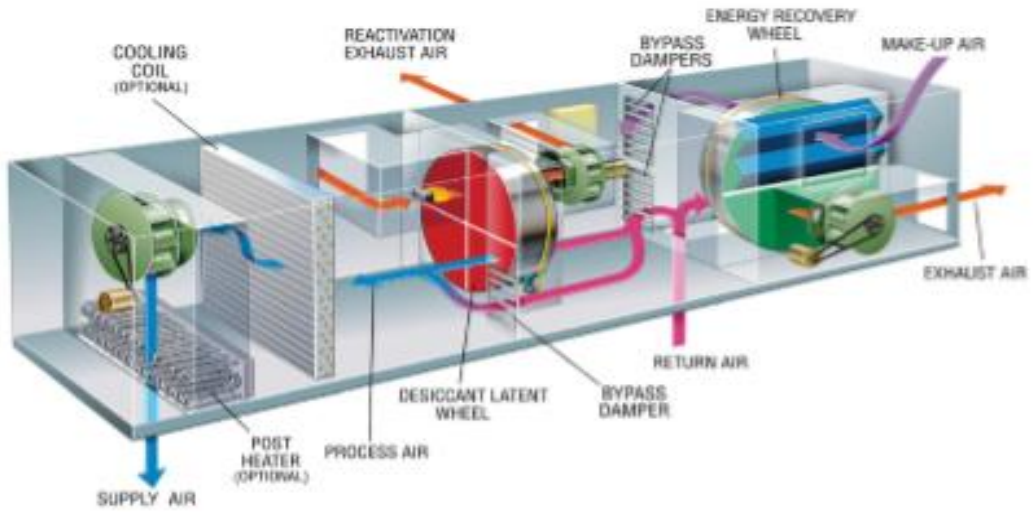

Fig. 3 Final approximate design

viii. CONCLUSION

It may be resulted that, the performance of desiccant cooling system is extremely impacted by ambient air humidity ratio. Higher the ambient air humidity ratio, lower is the COP. Resource energy savings of 40%-80% can be known over a vast range of operating conditions, when comparing steady-state performance of the hybrid with prevalent systems. These outcome shows the promise for developing energy-efficient, air-conditioning by prolong subsist state-of-the-art technology and gives assurance to further research and analysis. Seasonal simulations of the hybrid systems should be takeover to establish realistic energy savings while operating under variable loads and transient-operating conditions. The effort should involve industrial participation from manufacturers of dehumidifiers and vapour-compression equipment.

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