

Design & Manufacturing of Concentrated Solar Power System for Steam Generation

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Abstract: Due to a lot of usage of coal for many applications has been increasing exposure to fuel price volatility, exacerbating local air pollution, and hastening global climate change. Solar energy as one of the renewable one is derived from natural processes that are replenished constantly. In other words by using renewable source of energy, termination of fossil fuel source and their harms to the environment will be-prohibited. This precious resource is free, inexhaustible resource, yet harnessing it is a relatively new idea. According to the point that solar energy is the energy derived from the sun through the form of solar radiation, in his paper an attempt is made to explore the application of solar i.e., concentrated solar power technique to harness the energy for steam production.

Keywords: Concentrating Solar Power (CSP), Concentrated solar power Renewable energy, CSP-Direct steam generation

I. INTRODUCTION

The Earth receives an abundant amount of solar energy. Continuing to use fossil fuels is bound to pollute the atmosphere, and consequently, unwanted greenhouse emissions and climate change effects will come to dominate every part of the earth. Concentrating Solar Power, CSP systems use lenses or mirrors combined to focus sunlight which is then used to generate the steam. The basic mechanisms for concentrating sunlight are the parabolic trough, parabolic dish. The high temperatures produced by CSP systems can also be used to provide heat and steam for a variety of applications. For appropriate functioning of CSP sunlight requires and are of limited use in locations with significant cloud cover.

II. TECHNOLOGIES OF CSP

Parabolic Trough

A parabolic trough solar collector is designed to concentrate the sun's rays via parabolic curved solar reflectors onto a heat absorber element – a “receiver” – located in the optical focal line of the collector. The solar collectors track the sun continuously. The key components of a parabolic trough power plant are mirrors, receivers. The receiver consists of a specially coated absorber tube. The absorbed solar radiation warms up the heat transfer fluid flowing through the absorber tube to almost 400°C.

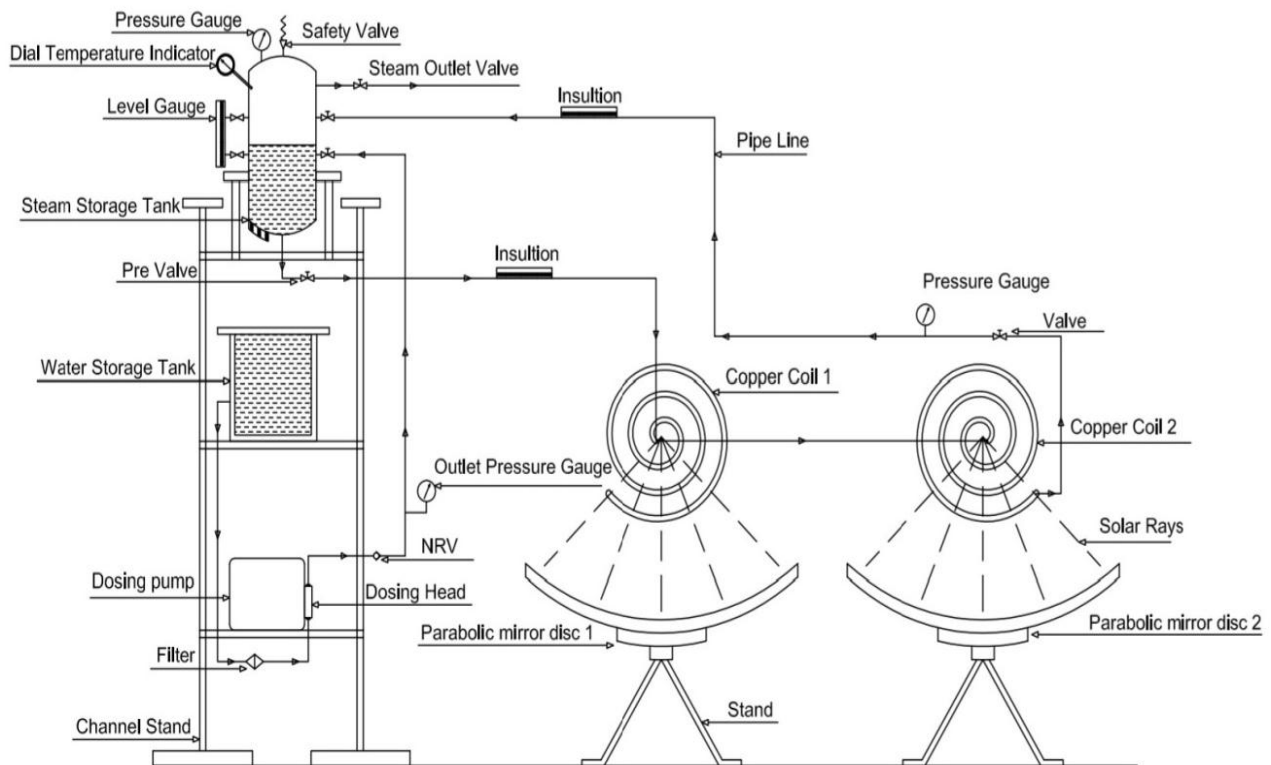
Solar Towers

Solar Central Tower systems have a single receiver placed on top of a tower surrounded by hundreds of mirrors (heliostats) which follow the apparent motion of the sun in the sky and which re-direct and focus the sunlight onto the receiver. The key elements of a solar tower system are the heliostats – provided with a two-axis tracking system – the receiver, the steam generation system and the storage system. The number of heliostats will vary according to the particular receiver's thermal cycle and the heliostat design.

Parabolic Dish System

Another type of concentrating solar collector that optically reflects and focuses the sun's incident solar energy onto a small receiving area using mirrors or lenses is called a Solar Dish Collector, or more technically, a point focusing collector. By concentrating the sunlight to a single spot, the intensity of the receiving solar energy is magnified many times over with each mirror or lens acting as a single sun shining directly at the same focal point on the dish meaning that more overall power per square meter of dish is achieved.

Components of CSP



1. Parabolic Dish
2. Thermal Absorber
3. Dosing Pump
4. Pressure Vessel

III. WORKING

First the stored water is sucked by dosing pump, the pump sucked water at 6LPH water which will be delivered towards Steam Storage Tank And then it move toward Thermal Absorber. The spiral coil which is made up of copper 3/8” diameter, The is circulated through this coil due to spiral shape of coil the water get more contact with surface of coil. Parabolic dish which is made by using no of mirrors, by calculating the focal point of solar rays the spiral copper coil is fitted at that point, at focal point collect all solar radiations at specific one point which gives desire output temperature. The temperature which helps to vapourise the water into steam we use two parabolic dish and absorbers first water circulated into first coil in which 60% water get vapourised the remaining water content will get vapourised into another spiral it also helps to pressurised the steam.

Semi superheated steam is then collected at Steam storage tank , the tank which is made up of Stainless steel the tank which consist of pressure gauge to show the inlet pressure of steam , The level gauge which helps to show water level of Steam Storage Tank, the tank is also consist of Safety valve to avoid any problem of high pressure. The tank is maintain so the water level at some desired level, by using gravity force the water supply towards Thermal absorber.

IV. CONCLUSION

We have studied and take some tests on spiral coil absorber and compare this results with cavity type absorber. we changes the conventional method of steam production by CSP.



V. ACKNOWLEDGEMENT

The authors acknowledge the support & help provided by our guide, **Ms. S. Burgul**, Assistant Professor, Trinity Academy of Engineering, Pune and also grateful for valuable guidance & encouragement to carry out work.

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