Using Scheffler dish for Steam pressing

Purple Creations,
Baramati Pune

pwc

Purple Creations Pvt Ltd is located at the Baramati Hitech Textile Park, Pune district of Maharashtra. The organisation manufactures, supplies, and exports kids apparel. It produces kids' garments ranging from chest printed t-shirts to two-piece sets for both boys and girls(both woven and knitted products).Recently, the company has forayed into manufacturing denims. The product line is produced in-house.

Technology

Purple Creations has installed a Scheffler Dish based system for steam pressing requirements. Purple comprises of 30 SolPac D16 Scheffler Dishes each of 30m^2 aperture area. These dishes are connected in a series and parallel combination and generates steam at 150°C and six bar pressure. It is installed in an open area near the utility section of the factory. The total collector area for the dish assembly system is 480 m^2. The installation is recent and is about seven to eight months old.

SolPac D16, the solar parabolic dish from Thermax, is a 16 m^2 Scheffler Dish which focuses the thermal energy from the sun on to a point receiver that concentrates heat. This heat is carried by the water flowing through the circular receiver. To increase concentration efficiency special solar grade mirrors are used. The overall system assembly consists of the concentrator dish, receiver, tracking system, and supporting structure. It is capable of delivering temperatures up to 150°C, and is equipped with a tracking mechanism for improved efficiency.
The system is capable of tracking the movements of the sun automatically throughout the day with the help of automatic tracking system (i.e. east to west), focussing the sunlight exactly on the receivers which are connected to the header. The process of energy generation is natural, eco friendly and long lasting.

Each module of a Solpac D16(16 m^2) has a total shade free area requirement of 35 m^2 and a weight of 400 kg. A single module has an output capacity of upto 6 kW_{th}.

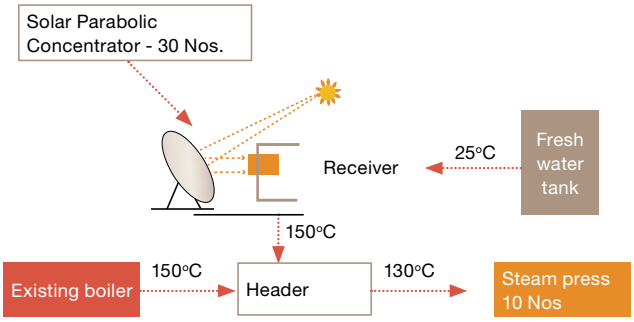
SolPac™ D16 parameters (single Scheffler Dish concentrator)	
Heat delivery	30000-35000 Kcal per day
Total aperture area	16 m^2
Total shade free area	35 m^2
Total weight	400 kg
Tracking	Single axis automatic tracking

System details	
No. of Scheffler Dishes	30
Total aperture area	16*30 = 480 m^2
Total shade free area	35 m^2
Total weight	400 kgs*30 = 12 tonnes
Manufacturer	Thermax Ltd

Application

Totally, 30 single axis tracked parabolic dishes (scheffler dishes) were installed. The principle application of these dishes is to supply steam at a temperature of 150°C to the steam pressing section. The unit utilises the steam generated from the solar collectors for their pressing needs during the day time or when sunlight can be captured . While the light is sparse existing LPG fired boilers are activated.

Layout of the plant



Solar technology: An alternate choice

Purple Creations had been using LPG prior to solar concentrators for their pressing requirements. They used commercial LPG cylinders of 47 kg each and during an ordinary month they were using 20 such cylinders for their steam pressing department. It was difficult economically to continue running the pressing section since commercial LPG prices have been witnessing an upward trend and ensuring its availability was also turning out to be an uphill task. The management also had to depute one employee to ensure an uninterrupted supply. Pilferages and wastages were also noticed in the usage of LPG. At current LPG rates, Purple has been saving close to 90,000 INR each month by running solar concentrators and avoiding LPG usage for the garment pressing section.

Fuel savings and project economics

The total cost of the system is 90,00,000 INR. This also

includes balance of system cost such as piping, civil works etc which vary and are specific to every installation. Since this is a Scheffler Dish based system with single axis automatic tracking the subsidy on benchmark costs stands at 5400 INR per square metre. The total subsidy applicable for the system based on MNRE benchmarks for 480 m^2 is 25,92,000 INR. Thus the overall project cost minus the subsidy available from MNRE is 64,08,000 INR. The financial analysis also addresses the fact that an additional accelerated depreciation benefit of 80% of the project cost is available for the unit owner. This accelerated depreciation is available under the IT Act and can be availed on 80% of the cost incurred on solar concentrators. This benefit can be availed to reduce the tax outgo in the first year of expenditure.

The assumptions for financial feasibility for the project site are as follows:

Cost of fuel replaced (LPG)	900 INR per cylinder (commercial purchase cost)
Annual escalation in fuel price	5 %
Debt: Equity for beneficiary's contribution	70:30
Cost of equity	16 %
O&M as percentage of the project cost	1%
Inflation in O&M	1 %
Deration	1 %
Days of operation	275

Based on the above assumptions the results of the financial feasibility analysis that emerge are as follows:

WACC	13.41%
Project IRR	20.66%
Equity IRR	31.83%
Payback	4.8 years
Fuel savings (LPG)	15000 kg per annum (approximately)

Thus the project results in a payback of 4.8 years and Purple shall have recovered the entire investment in terms of project expenditure from the savings made with replacing LPG. The monthly savings of LPG for purple are in the range of 20 LPG cylinders each month translating into almost 90,000 INR on a monthly basis. In addition to it they shall also be addressing environment concerns by reducing the GHG emissions. After recovering the investment the plant will be operated at minimal operational costs for the entire project life of 25 years. Thus it advocates CST based systems to other industries for meeting their process needs.

Beneficiary's perception

The consumer speaks

"There is a great deal of self satisfaction with this kind of green initiative which I believe every corporate should adopt."

- Deputy Manager, Purple Creations Pvt Limited

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