

Solar Processing of Dal

India is a major pulse producing country and accounts for 1/4th of worlds pulse production. Around 14 to 15 million tones of pulses are produced in India. There are 1400 pulses processing unit in the country which accounts for a large employment among rural and semi urban population. In the last decade the dal processing units due to space constraint have shifted from open drying to conventional fossil fuel fired dryers or processing unit. This brings more pressure to the already burden energy sector. We are looking at the different steps involved in one specific pulse namely urad dal. Urad dal is a common intergradient in Indian breakfast food. The process of urad dal consists of the following steps:

- Cleaning of the pulses from external impurities using sieving machine.
- Pulses are given minute holes by moving it through two stone rollers.
- These pulses are sprinkled with vegetable oil.
- The vegetable oil sprinkled pulses are heated in a trough. The trough will hold around 4 tones of pulses.
- Hot air is produced by burning diesel or agricultural waste.
- The blower blows the hot air into the pulse kept in the open trough.
- 60 – 75 mins are needed at a temperature of 60 to 65^oC .
- The dal mill spend typical 4 to 5 batch per day and spends around 70 to 90 litres of diesel.
- After the heating the pulses are sprinkled with water. This shrinks the top skin of the pulse using rubbing stone roll mill. This pulse undergoes number of sieving operation to separate the skin from the full kernel.

On a south facing support frame a 230 m² area solar collector panel is installed. The solar collector panel consists of tempered glass at the top, a blackened special aluminum absorber and thick insulation. Cold air drawn into the solar collector was made to travel Zig Zag, picking up heat from the absorber. On a normal sunny day the collector delivers hot air above 65°C – 75 Deg C. A 5 Hp power blower is used to deliver the hot air from the solar panel to the point of usage. Insulated metal duct are used to avoid temperature losses. A temperature controlling device is used to prevent over heating of the product.

The System saves 60 to 90 liters of diesel per day. On rainy day and night time usage the company use the conventional fuel. Using automatic motor control, the unit operator could switch from solar heating to conventional heating by using one switch.

The solar panels need a little maintenance except a periodical cleaning with water. This Factory cleans the panel once in 15 days.

The quality of the product was also improved as per the statement of dal mill owner.

The owners of the Dal mill are very happy as they are able to take the investment within 2 years by fuel saving and government concession.

The system have a life of more then 15 years with proper maintenance.