

VLT

VLT® drives reduce energy bills and enhance product life in Indian cold store

A cold store at Kartarpur, in the state of Punjab, India, uses only VLT® drives and soft starters for refrigeration. 22 VLT® drives and 5 MCD soft starters are installed and consequently the electricity bill has been halved.

“I have used Danfoss products wherever I can”, says Mr Kunwar Charanjit Singh, owner of the cold store.

Kartarpur is synonymous with the cold storage industry. The area has around 450 cold stores, more than any other district in India. The area is very conducive for the growth of seed potato and onions that are supplied to the whole of India and to neighboring Pakistan.

Established in 1977, the plant was based on older technology and was an energy guzzler. So in 2004 it was decided to renovate the facility by upgrading the insulation of the cold store, investing



in variable speed compressors for the refrigeration plant, installing a variable speed air circulation system, precisely controlling the internal environment and reducing manual intervention.

The solution

Two new 75 TR, 75 kW Bitzer screw compressors were installed, controlled by Danfoss VLT® 5000 series drives.

The diffuser system was replaced by DX type induced draft evaporator units which

circulate the cold air into the refrigerated space, and all fans and evaporators were equipped with VLT® drives.

Once the products are cooled down to the storage temperature, the cold air has to compensate for ambient conditions and heat loss only. This requires part load only and the fans can be run at lower speed – typically about 50% of nominal speed.

The compressor speed is adjusted based on the refrigeration load (the suction pressure) and the temperature inside the storage area.

During product loading, the compressors run at full speed of 3400 rpm. Once the products are cooled down to storage temperature, the load reduces drastically and the compressor is run up to 2000 rpm only.



Energy savings

The compressors have about 3000 operating hours a year. Out of this, an average of 45% is at maximum speed of 3600 rpm (at 60 Hz), 30% at normal speed of 45-50 Hz and 25% at half speed (at 30 Hz).

When the compressors are operating at full speed, they each consume 96 A and 60 kW. At half speed, consumption is 46 A and 16 kW and at normal speed, 92 A and 56 kW.

Paid back in two years

After three years of operation, the drives have recorded 8554 running hours and consumption of 420,900 kWh. 92,340 units of energy have been saved since their installation. At an electricity cost of 0.1 US\$ per unit this works out to a savings of 9346 US\$ in a three years period. The payback period is around 2 years.

On the evaporator fans, there are relatively higher savings. When the fans operate at 50% speed, the power consumption is almost 20% of the full speed consumption.

Customer benefits:

- The electricity bill has decreased from 7,300 US\$ to 2,200 US\$ per month, the majority as a result of the installation of VLT® drives.
- Better control of the internal environment gives longer storage life for the products.
- Longer storage life enables the company to wait for higher market prices, realising higher returns on investment.



Why Danfoss?

Ease of use

VLT® drives are easy to use and program. Even unskilled workers can operate the drives and change speed when required.

Minimum maintenance

No regular maintenance is required. No maintenance costs are incurred. VLT® drives just go on and on.

Special motors not required

VLT® drives are easy on motor windings and can be fitted on to any standard 3-phase cage motor – for compressors as well as other applications.

Easy to retrofit

VLT® drives can be retrofitted to existing applications and commissioned rapidly.

Trusted name

Danfoss' name is synonymous with refrigeration applications and is a safe choice.

Longer cable lengths

Compared to other makes of drives the VLT® drives can operate with longer cable lengths (up to 150 meters), which means that it is possible to install VLT® drives centrally in an MCC panel and cable them to motors further away in the plant.

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