ENGINEERING TOMORROW

Case story | VLT® Solutions

VLT® AutomationDrive control of Kamenitza's compressors drives down costs

Energy cost reductions were realised at Kamenitza following the installation and commissioning of VLT® AutomationDrive for the cascade control of a group of compressors. The subsequent short return on investment time has delighted Kamenitza staff.

Until 2010 the Kamenitza brewery was a part of the InBev brewing group. Since then, StarBev have owned the brewery, along with another in the Bulgarian town of Haskovo. Serving both the local and export markets, Kamenitza is one of Bulgaria's biggest beer producers.

Engineering personnel at Kamenitza have for many years used Danfoss frequency converters and they understand the advantages and reliability they offer. With the aim of energy saving and simplicity of operation, they decided to install a VLT® AutomationDrive on an existing 55kW MAHLE screw compressor group originally commissioned in 1994. Because of their confidence in the Danfoss product, they decided to carry out the installation themselves.

Meeting the requirements of the customer

During initial project discussions, the customer requirements were fully considered. They decided on a high protection class of IP55 and requested an integral mains isolator, as this was seen as both economically and technically a better solution than to use a lower IP rated drive with separate mains switch. Mr George Kaishev, Kamenitza's Technical Project Manager saw this as the ideal solution; simple to install and requiring no additional equipment. A true stand-alone drive solution.

Quick and easy commissioning
The compact unit size of the IP55 rated unit, coupled with easily accessible cable terminations were seen as real advantages, saving both time and the commitment of additional resources. The USB port provides a quick and easy connection for the VLT® Software Tool MCT10 to assist with programming and commissioning, further simplifying the implementation process.
According to Mr Kaishev, the graphical display, selectable for Bulgarian language simplified the process even further. With its capability to display five operating parameters simultaneously, critical values could be carefully monitored during commissioning.

Energy efficiency
By matching compressor performance to process requirements, power consumption is greatly reduced. According to Mr Kaishev, following commissioning significant savings have already been seen and it is expected that the investment will be recouped within 18 months.

Drive operation of screw compressor
Almost every rotary screw compressor uses a slide valve for unloading. The slide valve moves along the length of the rotors, reducing the compression length within the rotors.

Although this control method is infinitely adjustable and provides reasonable suction pressure control, there can be a substantial power penalty associated with slide valve control. As the compressor unloads, there is not a proportional reduction in power.

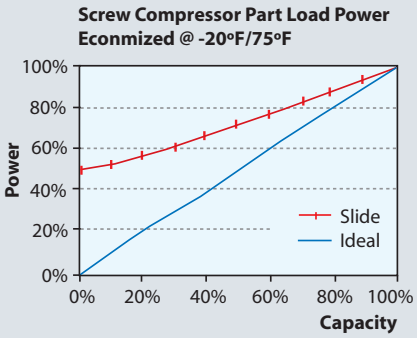

Figure 2: Typical screw compressor part load

A typical screw compressor part load curve is shown in figure2.
In general, part-load performance degrades with deeper suction or higher discharge pressure. Also, economized compressors typically lose economizer operation at approximately 75 % slide position. Below this position, the compressor operates non economized.

Most screw compressors can operate down to 50 % speed, as rated by the factory. Below 50 % speed, the slide valve must be used for further capacity reduction. The improved part-load power curve is shown in figure 3.

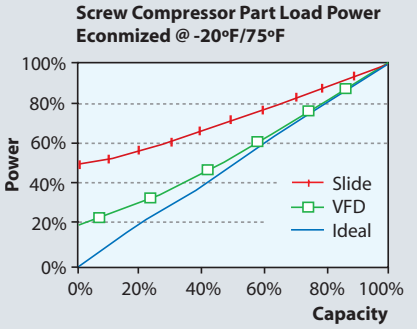

Figure 3: Improved screw compressor part load

Note the substantial improvement in compressor performance throughout the entire range of loads.

The concept with a compressor pack with a master drive connected in parallel with several fixed speed compressors is based on intelligent frequency converters. These frequency converter types can handle the open-loop and close loop control tasks in the compressor pack. The main function of intelligent frequency converters is to maintain the suction pressure constant by continually adapting the speed of the variable speed compressor.

The benefit by using cascade control compressors is to reduce the size and the cost and to keep the same or better capacity.
To use drives to control speed increases the COP (coefficient of performance) of the system and reduces the energy consumption.

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