Case story

When every hundredth of a second matters, **VLT® drives** make the difference

In bobsleigh and luge sporting events, every hundredth of a second counts for the pilots. Besides driving skills and sporting ability, the high-tech facilities are also extremely important. To be able to provide these sports with suitable training and competition conditions, the Olympia Sports and Event Centre Innsbruck has extensively modernized its track, which was constructed for the Olympic Games in 1976, and brought it up to today’s standards.

During the tendering process for the new refrigeration systems, the decisive factors were the energy and investment costs required to operate the installation. ENERTEC Naftz & Partner OEG succeeded in putting forward the most impressive concept by specifying VLT® drives to control the separator and ammonia pumps. Cofely Kältetechnik carried out the modernization work.

20% lower electricity consumption, thanks to VLT® drives
20% savings
Calculations show that the operator achieves a reduction in electricity costs of around 20%.

80 kilometers of refrigerant piping
To cool the approximately 5,500 m² ice surface in the best possible way, around 80 kilometers of refrigerant piping has been laid along the track. The key component of the refrigeration system is the separator. It is operated by three screw compressors with a refrigerating capacity of 2,700 kW. The base load is supplied by a compressor drive, which is frequency-controlled by a VLT® HVAC Drive FC 102. With an electrical output of 315 kW, it is designed for rotational speeds of up to 4,000 rpm. Two further screw compressors, each driven by a 200 kW motor, cut in when required. Around 38 tons of natural ammonia NH₃ coolant circulates around the refrigerant piping of Austria’s largest refrigeration system. The natural ammonia coolant has both technical and ecological benefits. Compared to other coolants, it is both highly economical and safe, as well as environmentally sustainable, since...
ammonia does not damage the ozone layer or contribute to the greenhouse effect.

Perfect ice quality
For successful training and the best possible competitions, perfect ice on the track is vital. There are several factors which can have a negative impact on the quality of the ice. At the very top of the list is the height difference of 100 meters between the start and finish. Here, the temperature difference can quickly amount to between 4 and 5 degrees. If there is also sunlight on parts of the track, temperature variations can even reach double figures. Without complex, segmented temperature control, uniform cooling of the track would not be possible.

The track is divided into 42 sections. To optimize the temperature in each section according to requirements, it has an outside temperature and track sensor. To control the coolant, Cofely opted for Danfoss ICM motorized valves with ICAD 1200/600 servo motors for this project. They have menu-driven buttons and a built-in display. This enables application-related settings to be made with ease, and the current degree of valve opening can be checked during operation. This technology enables the ice quality to be optimized over the entire 1,200 meters of track, and temperature variations to be largely compensated for.

Efficient ammonia pumps
An important issue for the track operator was the energy efficiency of the system. When designing the four ammonia pumps and the fans for the four evaporative condensers, the planners from Cofely Kältetechnik once again opted for energy-efficient VLT® drives.

The 38 tons of coolant in the refrigerant piping must circulate at a defined flow rate according to the weather conditions. This is ensured by four powerful pumps which are each controlled by a VLT® HVAC Drive. Cofely also opted for the efficient VLT® HVAC Drive converter technology to control the four fans of the evaporative condensers.

Reliability and service make the difference
Effective AC drives now form the backbone of modern refrigeration technology, as found on the bobsleigh, luge and skeleton track in Innsbruck-Igls. The pioneering Danfoss VLT® HVAC Drive is an essential component of this system, as it reliably ensures the entire operation of the track and a high level of energy efficiency. As the operator, the Olympia Sports and Event Centre Innsbruck relies on Danfoss quality and efficient service.
AC drives with energy-saving potential

In modern, energy-efficient air conditioning and refrigeration systems, AC drives such as VLT® HVAC Drive are essential for controlling pumps and fans, as they provide the basis for significant energy savings. As experienced developers and manufacturers of AC drives, Danfoss has applied its entire expertise in order to optimize the VLT® HVAC Drive specifically for the requirements in building services. Besides numerous proven functions, such as automatic energy optimization, the VLT® HVAC Drive is therefore also in control of a variety of innovative features, which also includes PID Auto Tuning, such as the ‘free’ PID controller. The system is designed in such a way that it can be easily adapted to the task in hand and extended. VLT drives are also equipped to be future-proof: besides three-phase asynchronous motors, the devices can also drive PM and synchronous reluctance motors.

The developers of the VLT® HVAC Drive paid particular attention to the energy-efficient operation of fans, centrifugal pumps and compressors, for example. As a result of the chokes and high-quality EMC filters, which are already integrated into the converter, the VLT® HVAC achieves the perfect EMC properties. This saves space and ensures trouble-free operation in the control cabinet and during installation in the field. Using its GLCP, the converter is easy and intuitive to use, and can be put into operation quickly.

The system taps into further energy-saving potential using its proven AEO function. It ensures that motor magnetization is energy-efficient at all times in all speed and load ranges, and can increase the energy efficiency in part-load operation by 3 to 7%.

The VLT® HVAC Drive guarantees energy-efficient operation of fans, centrifugal pumps and compressors, for example, and offers perfect EMC properties as a result of the integrated chokes and high-quality EMC filters.