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The NuAire Group produces one of the world's widest ranges of ventilation fans and equipment, from domestic bathroom and toilet extract fans to large commercial/industrial units. The company is also a market leader in condensation control equipment for public housing, and has developed an industry leading range of ventilation controls for the commercial sector. NuAire currently has customers in over 25 countries worldwide. Located in Caerphilly, South Wales, United Kingdom, NuAire has about 300 employees.

Stability minimizes the need for calibration and maintenance, helping to reduce the total operating costs of the system.

The fan action is directly controlled by the sensors. When the occupancy sensor detects people in the room and the carbon dioxide level starts rising, the fan switches on, supplying the right amount of fresh air to the room. This prevents the rooms from becoming stuffy and provides healthier conditions for the occupants. Since the fan is used only when needed, this eliminates excess energy consumption.

NuAire's experiences with Vaisala instruments have been good. So far, we have installed ten systems with Vaisala sensors, and they have measured up to our expectations. All the transmitters are working fine. ■



The Ski Tunnel has attracted skiers from all over the world.

Never-Ending Winter

In the Huurre Ski Tunnel in Finland, optimal conditions are always guaranteed. Vaisala transmitters play an important role at this indoor ski track, continuously measuring the prevailing humidity, temperature and carbon dioxide levels.



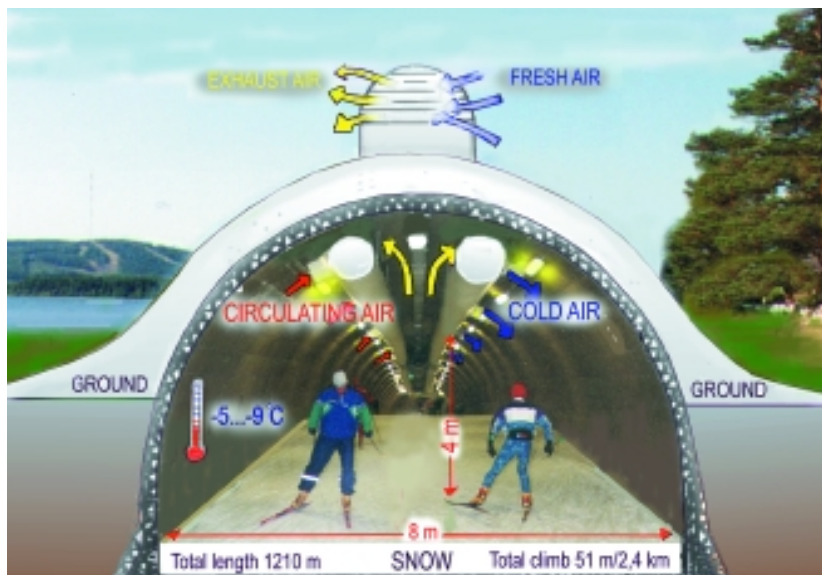
The housing of HMP140 transmitters provides IP65 protection from dust and sprayed water, so these are suitable instruments for humid spaces and outdoor installations.

The Vuokatti Ski Training Center is located in central Finland. Skiers from all over the world come here to train – even in the summer time. The main attraction is the 1.2 km Ski Tunnel, which has a 2.4 km natural snow surface ski track. With curving trails and hills, the conditions are similar to natural outdoor ski trails in every respect.

Winter conditions guaranteed

The winter weather conditions in the tunnel are optimal – there is snow and fresh air, but it is not too cold. Because the conditions are stable, weather-related risks and inconveniences are not a factor. An advanced ventilation system provides humidity control and good air quality. Humidity, temperature and carbon dioxide levels are measured with

Schematic drawing of the tunnel system.



Vaisala transmitters. The main measurements are taken inside the tunnel and from the inlet and exhaust air of the refrigeration units. HMP142 humidity transmitters and GMD20 CO₂ transmitters are used to measure humidity, temperature and carbon dioxide in the ventilation ducts, while HMP143 transmitters measure the humidity and temperature of the snow.

Mr. Vesa-Pekka Sarparanta, Executive Director of the Huurre Ski Tunnel, came up with the idea of the tunnel in the 1980s, when he was a trainer for the Finnish national cross country skiing team. "There was a clear need for stable training conditions for competition skiers. In the summer, these conditions can only be found at high altitudes – for example on glaciers at 1900 m. These are not good training conditions, however, because they require daily travel and altitude adjustment."

After he saw snow making in laboratory conditions in Italy, Mr. Sarparanta put his plans in motion. Construction of the highly innovative Ski Tunnel began in April 1997 and was completed in eight months.

Unique refrigeration system

Sabroe Finland Oy, a company with extensive experience in refrigeration techniques, was in charge of the planning and implementation of the refrigeration system for the Ski Tunnel. Mr. Marko Matkavuori, Electrical Engineer from the Sabroe project team, comments on the start of the project: "We realized early in the planning stage that there would be some difficult measuring points because of the discrepant conditions caused by snow making and other factors. We decided on Vaisala's measuring equipment at this time, based on its recognized quality and Vaisala's good technical support."

The air and snow temperature and the air-conditioning in the tunnel are monitored and controlled by computer technology. The inside air and snow temperatures are normally between -5 and -9°C, but can be dropped to -18°C if needed; even ice formation is possible. The tunnel air is completely exchanged every four hours. The snow making system consists of high pressure cannons that replenish the trail surface at night when required, normally every two weeks.

The ventilation is controlled by measuring the carbon dioxide levels so the amount of fresh and exhaust air always corresponds to actual demand.

This avoids any unnecessary load on the refrigeration system when there are no activities in the tunnel.

Four machine rooms, each with a ventilation machine and two separate refrigerators containing a compressor and an expansion coil, provide refrigeration and ventilation. The rooms are located above ground more than 300 meters apart. The machine rooms have programmable controllers connected to the Windows-based monitoring program in the control room. These are wired with an RS485 bus. The system can be remote accessed and programmed through a modem in the monitoring computer. All Vaisala

transmitters are connected to this system. The output data from the transmitters is fed to the monitoring program from which all settings, including the desired temperature, can be altered.

Sabroe's initial plans for the tunnel's refrigeration system have been a success. Mr. Sarparanta does see some future challenges, however, as far as optimization of the system is concerned. The relative humidity in the tunnel is normally between 85–95% RH. According to Vesa-Pekka Sarparanta: "One possibility would be to lower the humidity to around 80% RH. No evaporation would take place at this point – so the snow itself would act as 'a polar radiator'. Control of the humidity equilibrium in general is another key issue." The greatest sources of humidity peaks are snow making and the fresh air that is introduced into the tunnel.

Landscaping is a future project. Plans call for the tunnel to be protected and concealed by a layer of soil, after which it will



Vesa-Pekka Sarparanta has been pleased by the international interest and welcomes visitors to the Ski Tunnel.

look much like a naturally occurring ridge.

A winter wonderland

The main purpose of the Ski Tunnel is to provide facilities for cross country skiing for both competitors and fitness trainers when there is no snow outdoors. The tunnel is also ideal for testing cold-weather phenomena and equipment in winter conditions. For companies whose operations and products are connected to winter, including manufacturers of clothing, skis and ski waxes, for example, it is an excellent facility for product development and testing. Other activities include medical studies connected to exertion asthma or exposure to cold, as well as industrial tests (of car tires, for example).

Tourists are another target group. Mr. Sarparanta has been gratified by the international interest in the tunnel, which has attracted some 20,000 visitors from 40 countries. He expects to see more ski tunnels in future. "After all," he says, "they are based on the same principle as indoor swimming pools."

Vesa-Pekka Sarparanta has a strong background in both engineering and Finland's sports scene, as well as a fascination with new ideas. In the past, he was head trainer for Finland's cross country skiing team and director of the Vuokatti Ski Training Center, which has been in existence for 50 years and is Finland's third largest sports center.

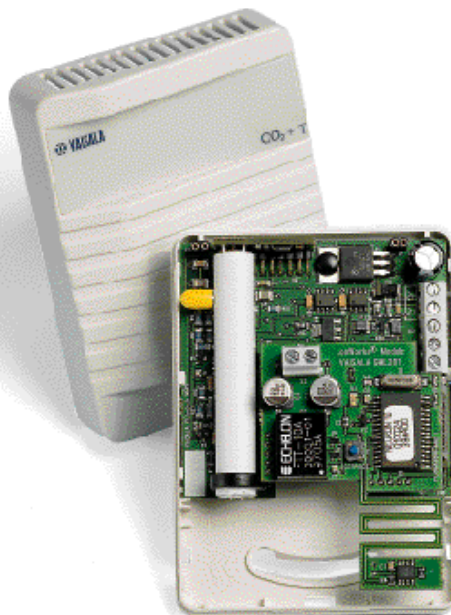
"Vaisala has long experience in measurement techniques and strong know-how – their transmitters have been a reliable choice for us," says Mr. Sarparanta summing up his experience with Vaisala. ■

GML20T and GMD20D New CO₂ Products Complement the GM20 Series

Two new products have been added to Vaisala's carbon dioxide CARBOCAP® transmitter series. When installed in the GMW21 transmitter, the new GML20T module makes it possible to measure temperature in addition to carbon dioxide levels. Like the previously launched GML20 module, the GML20T is also compatible with LonWorks®.

The GMD20D is a display version of the GMD20 duct mount carbon dioxide transmitter. In Vaisala's duct mount transmitters, the sensor head is inside the ventilation duct. The display cover is especially useful for special applications and during calibration checks, for example. GMD20/D transmitters are small in size, and they offer outstanding performance and versatility.

The GM20 series of carbon dioxide transmitters is known for its superior stability. Combined with the interoperability of LonWorks®, the result is a cost-effective, flexible and reliable solution for building automation systems. ■



The GML20T module, which is installed inside the GMW21 transmitter, enables carbon dioxide and temperature measurements.



The duct mountable transmitter GMD20D with a digital display.