ENGINEERING TOMORROW

Case story

Traffic **safety** in new tunnel **relies on VLT® drives**

VLT® drives and soft starters in the Sellero tunnel in Italy ensure safe and reliable ventilation.

The 5,047 m long Sellero tunnel connects the towns of Darfo and Edolo in the province of Brescia in Italy. Allowing traffic to bypass the towns of Capo di Ponte, Sellero, Cedegolo and Berzo Demo, the tunnel reduces travel times in the area. To ventilate the tunnel, Elef Srl, a company renowned for the design and production of electrical and mechanical systems, both in industry and in the civil, chose the reliability and high performance of Danfoss VLT® drives.

Smooth ventilation and motor protection with soft starters

The tunnel is constantly ventilated by 22 blowers, each equipped with a 55 kW three-phase motor running on a 690 V power supply. In normal conditions, the air is blown towards the entrance or the exit according to the natural flow created by the wind outside. Each blower is controlled by a Danfoss VLT® Soft Starter MCD 500 with integrated Adaptive Acceleration Control (AAC).

The soft starters ensure smooth ramp up and down of the ventilators, thereby protecting the motors. In addition, the integrated bypass in the soft starters has reduced wiring costs, and by eliminating an external contactor the it has been possible to reduce the size of the installation panel

Drives play important role in safety

Sensors distributed with regular intervals throughout the tunnel monitor the degree of air pollution. If emission levels exceed the preset threshold, or in the event of fire or excessive smoke, three air vents are activated to lead polluted air into a separate channel that runs above the road along the length of the tunnel.

The tunnel is also constantly ventilated by eight fans, each with a 300 kW motor, that work in pairs. Each of the fans is speed controlled by a 315 kW VLT® HVAC Drive FC102 drive in an IP 20 enclosure. If fire prevents people from exiting the tunnel via the normal openings, an escape tunnel that runs parallel to the ventilation canals above the road provides a safe way out by foot. Two 75 kW fans provide clean air.

Compact drives save installation costs

The 315 kW HVAC drives belong to the new D frame series, which units are up to 68% smaller compared to the previous D frames. They are controlled and monitored by a PLC via Modbus RTU, a fieldbus that is a standard feature in the inverters.
The compact size of the drives has made it possible to build dedicated electrical panels with particularly small dimensions. The cabinets are 800 mm wide and 1800 mm high, providing plenty of space for the inverter, a 800A disconnect, input and output wiring (2 x 185 mmq wires per phase), and the terminal of the auxiliary circuit, while leaving ample room for operators to maneuver.

Safety with optimised ventilation

In the event of fire the necessary air intake flow of 150mc /s is provided by 4 fans (2 pairs) running at 50Hz or 6 fans (3 pairs) at 35Hz. The client can easily choose the optimal combination and even couple the specific fans to be used.

- 3 fan units (6 fans) to 70% speed (35Hz)
- 2 ventilation groups (4 fans) 100% speed (50Hz)

Useful functions:

- "Flying start" ensures a well-controlled start-up even if the fan is rotating due to the drag from air currents
- Modbus is integrated in the drive enabling the plc to constantly monitor the drives
- The 8 VLT® High Power Drives always work in pairs.

Project at a glance:

Ventilation, Sellero Tunnel, Italy

- 8 VLT® HVAC Drive FC 102 VSDs for fan motor control, 315 kW, IP 20 enclosure, new compact D frame
- 22 VLT® Soft Starter MCD 500

VLT® | VACON®

Danfoss Drives, Ulsnaes 1, DK-6300 Graasten, Denmark, Tel. +45 74 88 22 22, Fax +45 74 65 25 80, drives.danfoss.com, E-mail: info@danfoss.com