

Products from SEW-EURODRIVE can be found in the harshest of environments. At the Ceneri base tunnel project in the Swiss Alps, 4 large SEW-EURODRIVE gear units are being used, that help remove excavated stone on conveyor belts that stretch for kilometres through the tunnel shafts. The units have been in use continuously since 2014, and the tunnel is expected to be completed by 2019. With high ambient temperature and no time for maintenance work, the success of the project relies on first class products and perfect support, with short response times.

To know more about this complex project and how it is being executed, do read the full article below.

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Drive technology TODAY

The fast route south

thanks to SEW-EURODRIVE

► Products from SEW-EURODRIVE can also be found in the harshest of environments. For its work on the Ceneri Base Tunnel in Switzerland, AGR AG ordered four large SEW gear units, which are now helping to remove excavated stone on conveyor belts that stretch for kilometers through the tunnel shafts



► Construction work on the New Railway Link through the Alps (NRLA) is creating a fast, high-speed railway through the mountain chain. At the heart of the link are the base tunnels at Gotthard and Ceneri. The flat route, which features minimum gradients and wide curves as it runs through the Alps, offers an efficient means of transporting goods by rail and significantly reduces travel times for national and international passenger travel. Over a distance of around 60 km, the trains can reach top speeds of up to 250 km/h.

The new route is designed to boost the public transport system and move as much heavy goods traffic as possible from road to rail. What's more, in building the new Gotthard rail link, Switzerland is undertaking one of the biggest environmental protection projects in Europe. The rail route is helping to protect the Alps. ►

The Ceneri Base Tunnel is the second-largest tunnel-building project in Switzerland, after the Gotthard Base Tunnel. Although its bigger brother forms the heart of the NRLA, it is only by linking up with the Ceneri Base Tunnel that it creates a continuous flat route.

The construction concept

In 1994, after a long and difficult process of planning and negotiation, Swiss Federal Railways (SFR) and AlpTransit Gotthard AG took the decision to cross the Magadino Flat. Vigana was selected as the north portal and Vezia as the south portal. Building work was officially launched on June 2, 2006 in Camorino by the President of the Swiss Confederation, Moritz Leuenberger.

The tunnel system consists of two single-track tubes spaced 40 m apart that run in parallel and are connected by cross-passages every 325 m. Planning for the construction work had to take account of crucial factors such as the densely populated local areas close to the portals and how to cross under or over key traffic arteries. That is why the tunneling work is mostly being carried out from Sigrino, which is also home to the ventilation control center with incident ventilation. It is from here that the workers are driving forward in both portal directions, using only conventional blasting techniques to break through the rock.

The bigger the project, the more you need AGIR

AGIR is always involved in crucial construction projects of national importance, and AlpTransit is counting on its expertise, particularly when it comes to

plant construction. In the NRLA project, Zürich-based AGIR is responsible for transporting and storing materials blasted out of the tunnel and overseeing the preparatory steps for lining the tunnel tubes.

The tunnel builders currently need around 1600 metric tons of building materials every day to line the tunnel. "Over 1000 metric tons of cement, sand and gravel (a whole train-load) arrive every day by rail from the supplier Holcim. The demand for building materials increases at peak times, when Holcim can end up sending us 2 to 3 trains a day," says Edwin Stutz, a project manager at AGIR. "To make sure we are not entirely dependent on daily deliveries, we've built a silo plant that allows us to carry on working for up to 20 days independent of deliveries. For example, if there's a break in the supply line and deliveries fail to arrive, we can last out until everything is restored."

The remaining 600 metric tons of material needed to line the tunnel each day is recovered from the stone blasted out of the tunnel itself. Conveyor belts several kilometers long carry this material out of the tunnel for further processing or storage, depending on its quality. Moving material of this weight over such long distances poses a huge challenge for any conveyor belt system. For added safety and reliability, two belts have been installed in the entry portal and, unusually, they are arranged one above the other rather than side by side, so that the fitters can access them more easily when changes need to be made. This significantly reduces downtime.



Harsh environment

It doesn't take long to identify the critical elements on conveyor belts such as these. While the rubber belts themselves can usually be used for years, the bearings and other small parts need to be replaced on a regular basis. The drives need to be serviced or carefully monitored at periodic intervals.

Four of the units that drive the conveyor belts have been supplied by Alfred Imhof AG. These 355 kW drives comprising helical-bevel gear units and three-phase current, foot-mounted motors have been in use since summer 2014, supplying continuous torque up to almost 60 000 Nm. Double oil seals and dust protection covers stop dust penetrating into the gear unit.

"We periodically change the oil on drives up to and including 55 kW," says Stutz. "When it comes to larger drives, such as those from SEW-EURODRIVE, we send an oil sample off to the lab for analysis every six to nine months. The purpose of this is to ensure the drives don't fail unexpectedly. Apart from two weeks in the summer and Christmas holiday periods, we simply don't have time for maintenance work. In a tunnel-building project, it's even more important than ever that cooperation runs smoothly, both within the team and with other companies. First-class products and perfect support are absolutely indispensable. So far, our experience with SEW products has been good. It's important that the service organization has short response times so that interruptions can be kept to a minimum if things go wrong."

Over time, it has become clear that the drives run at an elevated temperature. Peter Baumgartner, an application engineer at Alfred Imhof AG, explains: "Under the circumstances, this is entirely understandable. Given that ambient temperatures are over 40° C and thick layers of dust accumulate on the gear unit housings, the heat cannot be absorbed properly. That's why we are retrofitting water cooling covers to the gear units, which can be bolted on fairly easily underneath the inspection cover. This measure should lower the oil temperature by around 15° C."



Tunnels

Length of the Gotthard Base Tunnel	57 km
Length of the Ceneri Base Tunnel	15.4 km
Excavated volume	Approx. 7 million metric tons
Groundbreaking	June 2006
Planned opening	December 2019

Gear units

Bevel-helical gear unit	X3KH210/B
Power	355 kW
Operating torque /	57 552 Nm /
Gear unit rated torque	90 000 Nm
Weight	Approx. 4000 kg/ drive

Options

- Double oil seal
- Dust protection cover
- Elastic claw coupling
- Swing base
- FAG bearings for service life > 44 000 h

The opening of the Ceneri Base Tunnel is scheduled for December 2019. Once the route is up and running, the journey time between Zürich and Milan will be less than three hours. At present, the fastest journey time is three hours and 41 minutes. ◀