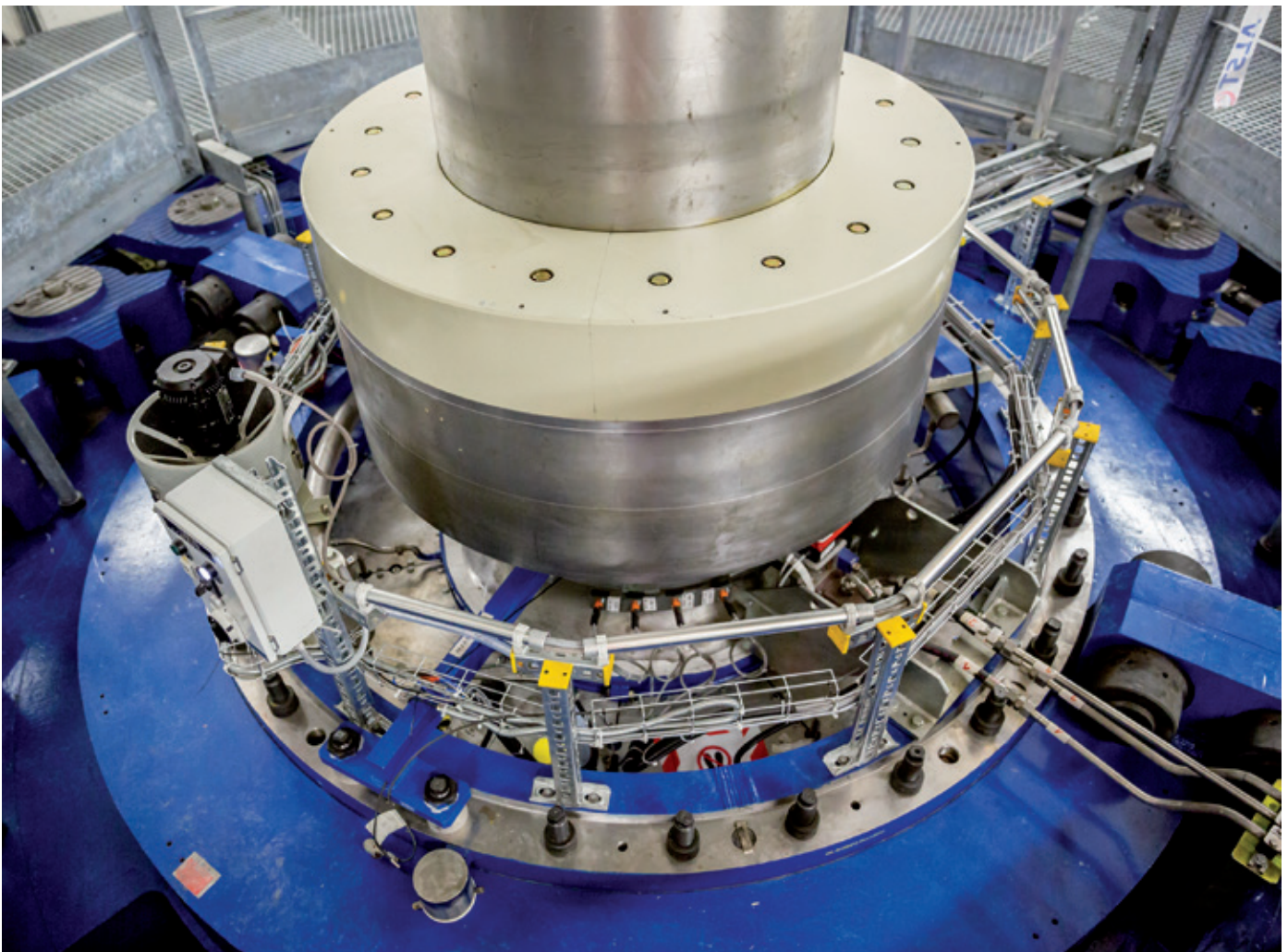


STAUFF formed connections at Swiss pumped storage plant

Foto: Axpo Power AG



Leak-free under extreme conditions

The hydraulic lines at the pumped storage plant Linth-Limmern in the Swiss Alps carry approx. 18,000 litres of oil. This requires absolute leak protection, because the connection systems for the lines are subject to strong vibrations. Unwilling to compromise in the future, the owners are having the originally used cutting ring fittings successively replaced with the STAUFF Form Evo system.

24° cutting ring are generally very durable and are regarded as the universal standard for connecting metric tubes with outside diameters between 4 and 42 mm in hydraulic systems, reliably and without leaks.

“For the application with the extreme conditions at the Limmern pumped storage plant,

however, it would have been better to use a different joining solution – tube forming – from the outset,” explains Uwe Bröllos. He is the Key Account Manager at Fluidtec AG in Kreuzlingen, the authorised STAUFF partner for Switzerland.

When leaks were discovered in 2019, only a few years after commissioning of the pumped storage plant, he was consulted

as an expert for hydraulic line systems. The damage analyses showed that cracks had formed in some of the cutting ring tube connections, caused by the permanent vibrations at the power plant.

Uwe Bröllos recommended successively replacing the cutting ring connections with the STAUFF Form Evo forming machine that was specially deve-

loped for high-pressure applications and strong vibrations.

Forming: the “elite division” among tube connections

The principle: The STAUFF Form machine is used to **reshape** the tube end so that a positive connection is created during installation with a conventional fitting body and a union nut.

The only conceivable leakage path is additionally secured with a Viton seal.

In contrast to this, a cutting ring connection is produced when a metal ring with two edges **cuts** – as the name already indicates – into the tube surface when a union nut is tightened. This incision into the material limits the vibration resistance.

The forming system, on the other hand, has a higher tear-out strength, which adds to the safety under extreme conditions – such as the strong pressure surges and vibrations at the Limmern pumped storage plant.

This is a crucial aspect for mechanical engineering and plant engineering manufacturers in safety-critical fields, such as ship building, offshore plants or cranes and lifting devices.

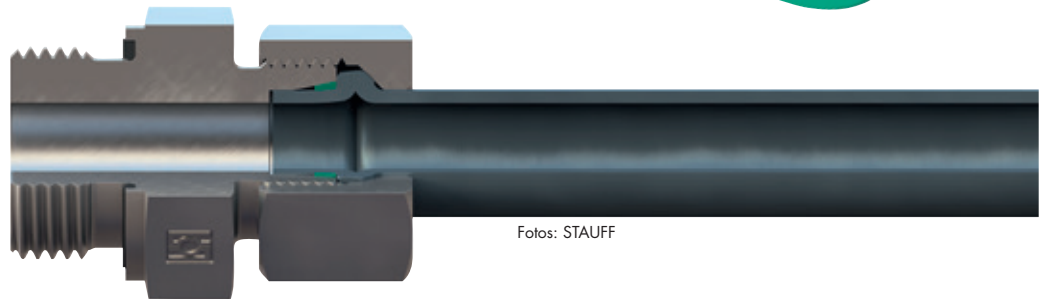
Battery in the mountains

Kraftwerke Linth-Limmern AG now also use STAUFF Form Evo. The Limmern pumped storage plant, which is built completely underground, is located in the Swiss Alps approximately 100 km from Zurich, at an altitude of around 1700 m. 160 cubic metres of water per second can be pumped from the Limmernsee lake to the Muttsee lake 630 m higher up and then drained again to generate energy on demand. After a seven-year construction period, the plant was commissioned in stages in 2016/17. It has four turbines, each with a capacity of 250 MW.

Oswald Hauser, Head of the Mechanical Engineering division, and his maintenance team decided to successively replace the stainless steel cutting ring fittings in the hydraulic line system with the STAUFF Form Evo forming system.

“Our focus is on operational safety, leak protection and

The Stauff Form EVO tube forming system is completely based on standard components and is available with the Viton seal. A positive-locking connection is tear-proof even under high strain.



Fotos: STAUFF

preventing environmental damage,” explains Oswald Hauser. *“By using a permanently sealed tube connection system, we are also significantly reducing our expenditures for maintenance and service work.”*

After all, several dozen kilometres of lines have to be checked at the Limmern pumped storage plant in tightly spaced maintenance intervals.

Personal introduction into analogue and digital operation

The support from Fluidtec played an important role in the decision for STAUFF Form. *“We are in very good hands with Mr Bröllos. We have been working with him in other areas for many years and he has helped us out of a fix many times, for example when we needed spare parts at short*



Foto: Uwe Bröllos

Uwe Bröllos (right) advises Oswald Hauser (left) and his maintenance team.

Foto: Axpo Power AG



Each of the four pump turbines has a capacity of 250 MW.

notice.” Oswald Hauser particularly wants to highlight the induction into the forming machine, the “heart” of STAUFF Form.

STAUFF employees travelled from the headquarters in the German Sauerland region to train the installation personnel. This highlighted additional

benefits of the forming system: Operation is simple, and changing tools for different tube diameters is easy.

Another design feature of STAUFF Form is that excessive or incomplete tightening is virtually impossible. The installation path after reaching the fixed point is clearly defined.

The short rotation path of approx. 15 – 20° makes it possible to install the system even in tight spaces and under challenging conditions.

In practice, the forming machines require regular software updates. With the latest generation of machines, this is exceptionally straightforward: Updates can be transmitted online. This is made possible by an integrated communication module with a SIM card. The communication features offer additional benefits for users.

The machine history and parameters, for example, can be viewed via an online service and analysed together with the account manager. The cause of a malfunction can be identified quickly and the quality of the forming process can be maintained at a high level.

Customers can use the de-

tailed documentation of the completed forming processes as proof of correct assembly. The data exchange with STAUFF’s own cloud is encrypted in both directions, reliably protecting data against third-party access, misuse and manipulation.

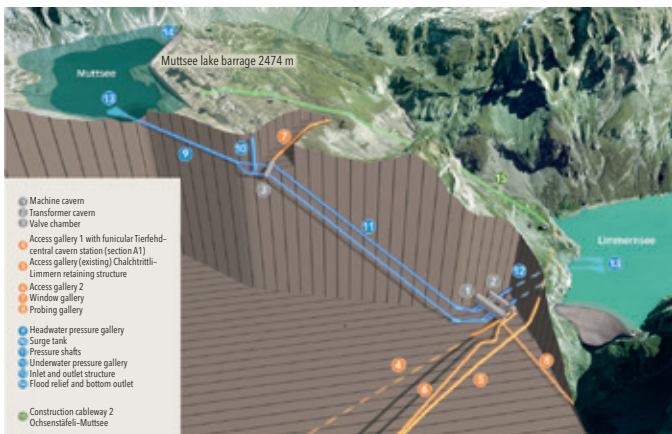
Oswald Hauser: “*The change to STAUFF Form is an important technical step for us and also an advantage with regard to work processes, reliable installation and maintenance effort.*”

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Foto: Axpo Power AG



The water is drained as required and can drive four turbines with a total capacity of 1000 MW.