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STRAUB SOLUTION:
A NEW WINTER LOOP-PIPELINE FOR THE GÖSGEN NUCLEAR POWER PLANT

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GÖSGEN NUCLEAR POWER PLANT
STRAUB - A NEW WINTER LOOP-PIPELINE

The first Swiss nuclear power station is located close to areas of high energy use. Currently, eight million kilowatt hours of electricity are produced which equal approximately 13 percent of the total electricity consumption in Switzerland. The Gösgen nuclear power station has an unlimited approval for operation provided safety will be ensured.
For renewing the winter ring main in the cooling tower of the Gösgen nuclear power station, STRAUB has been awarded the contract to carry out the entire project and construction management.

STRAUB accepted the entire project and construction management for replacing the winter ring main

Status survey: Pipes slipped off the fittings due to incorrect installation

Difficult installation conditions due to the 13 m height and confined space

The excess heat generated by the steam process, which amounts to 2 GW, is discharged into the atmosphere through a natural-draught wet cooling tower. The reinforced concrete cooling tower is 150 m high and has a diameter at the base of 118 m. The cooling air enters the tower horizontally between 50 pipeline supports, absorbs the heat of the cooling water and exits the cooling tower vertically from the top. A winter loop-pipeline allows the air to be preheated before entering the cooling tower, thus preventing the interior of the tower from freezing in low ambient temperatures.

THE CHALLENGE

The existing winter loop-pipeline proved to be damaged in several places. The solution for eliminating these areas was to replace the entire loop-pipeline (total length approximately 326 m, maximum diameter 616 mm). The core objectives were determining the thermal expansion of the pipeline, and properly supporting the pipeline using specially manufactured pipeline supports.

Preliminary discussions concerning the winter loop-pipeline were held in 2010. Conceptual mistakes made by the company which installed the pipeline in 2006 resulted in a variety of defects, so that its proper operation could no longer be ensured. At that time, it was assumed that only the partially damaged pipe fittings would have to be replaced in order to restore the full operation of the winter loop-pipeline.

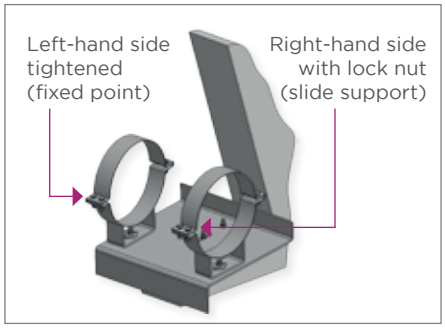
Documentation of damage

However, a status survey carried out thereafter revealed defects that could not be corrected simply by replacing the damaged pipe fittings. The pipes had partly slipped off the corroded pipe fittings because changes in pipe lengths were not taken into account. In addition, the pipes were deformed and could no longer operate as intended. The method of laying the pipes on the concrete supports, combined with the weight of the water-filled pipes, resulted in great tensions. Over the years, cracks and dents developed at the pipe ends.

Installing the winter loop-pipeline at a height of 13 m created a particular challenge. Space constraints also contributed to making the working conditions difficult, but despite this, safety was the highest priority.

THE SOLUTION

In close cooperation with the Gösgen nuclear power plant, STRAUB developed a complete solution that fully met the project specifications. The contract awarded by the plant comprised the complete planning, engineering and design, manufacture, delivery and construction of the new winter loop-pipeline and providing spare parts (including pipe couplings and pipeline supports), as well as the removal of the existing pipeline.



Outline of the new pipe support design for the winter loop-pipeline

Preparing a piece of pipe for installation

Pipeline supports

The design of the new supports eliminated the fundamental defect. This also ensured proper support for the pipes and absorption of the thermal expansion of the pipeline. One pipe support clamp is used as a fixed point whereas the other is designed to act as a slide support. To ensure this, the slide support is fitted with a lock nut to prevent the bolt from being firmly tightened (refer to the diagram). The pipe support clamp itself can be rotated by 360° on its own axis, thus adapting to any angular deflection during installation. Moreover, a 70 mm long groove allows the clamp to be moved by +/- 35 mm or 90° to the pipe axis.

A groove is also provided in the base plate that is bolted to the concrete support, allowing the bolts to be tightened without requiring modification.

The pipe bracket developed for the project allows for very fast and simple installation. After bolting the pipe brackets to the concrete support, the pipes were placed into the pipe support clamps, aligned, and tightened. Then the STRAUB-FLEX 3LS, which was already pre-fitted onto one pipe end, was moved over the gap between the pipe ends and tightened to the specified torque. To prevent the sealing sleeve from being damaged by the gap between the pipe ends, caused by the angular deflection of about 4°, each coupling was fitted with a stainless steel strip insert.

The resulting solution allowed the pipes to be laid with no inbuilt tension, compensates for building tolerances and is unaffected by changes in temperature.

Experienced partners

STRAUB commissioned Josef Muff AG, a company located in Sarmenstorf (Switzerland), to carry out the removal and installation. For this project, we decided to use quality application-specific HOBAS GF-UP pipes, which are manufactured from unsaturated polyester resins (UP), glass fibre (GF) and mineral reinforcement.

Its operators intend to run the Gösgen nuclear power plant for another 30 years. By designing and constructing the new winter loop-pipeline, STRAUB have made a substantial contribution to helping the operators achieve their goal.

The newly installed winter loop-pipeline including supports and STRAUB-FLEX pipe couplings

AS INDIVIDUAL AS YOU:
THE MODULAR ADD-ON PROGRAMME PLUS

Wherever the partnership starts, STRAUB will support you with its efficient project management and commitment to maintaining and safeguarding the highest quality standards. Beyond this, we offer additional optional services to suit you. We will support you in every process of your project with the right PLUS module, and harness the required skills with the bigger picture in mind.

The result: The right pipe system solution with significant added value for you.

Perfectly matched components

Module: System procurement

The most effective solution

Module: Situational analysis

Module: Pre-Engineering

Module: Engineering

Flawless operation

Module: Installation / Commissioning

Module: Service and maintenance

For more information on the modules, please visit www.straub.ch

STRAUB Werke AG
Straubstrasse 13 – 7323 Wangs – Switzerland
Tel +41 81 725 41 00 – Fax +41 81 725 41 01
straub@straub.ch

www.straub.ch

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