Press release

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Restoration of hydropower station with fischer injection mortar system FIS EM

In flow with fixings

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Even experienced professionals rarely witness underwater installation. The restoration of the VWEW-energie hydroelectric power station in Biessenhofen in southern Germany required this procedure. The facility came into operation in 1962 and will be refurbished by 2018. This procedure involves damming up the adjacent Wertach river in order to drain the work area. An underwater reinforced concrete wall was erected for this purpose and was secured using the fischer injection mortar FIS EM combined with reinforcement and concrete.

The restoration was moving along quickly – until frequent high levels of water damaged the auxiliary gravel dam in the Wertach river. The dam had been constructed in agreement with the responsible nature conservation authority. All attempts to keep the water away from the weir system failed using “big bags” – gravel-filled plastic sacks one cubic metre in size. More flood water caused the water level to rise so much that the floodgates were opened and the drainage took on further damage.

All further work on the part of the weir facing the Bärensee had to be put on hold. Meanwhile, pillars and walls in the direction of the Bachtelsee surrounding the turbine inlet had to be restored. The challenges presented by the floodwater were overcome by VWEW-energie, the operator and client, by erecting a new reinforced concrete wall at the suggestion of the engineering firm Dr. Ing. Koch Bauplanung GmbH and with the support

of the commercial diving company Kerlen Taucher GmbH. The wall was connected to the current dam wall and is 2 m thick and 9 m long. Together with a needle valve the reinforced concrete wall will separate the Wertach river from the working areas once it has been “raised”.

The professionals constructed the wall by attaching B 500B reinforced concrete with the fischer injection mortar FIS EM 1500 S in combination with 20mm-diameter connection sleeves to an existing ground plate. The material used meets ISO and Swiss SIA standards and is highly ductile, enabling it to deform plastically under load before yielding.

“Our fischer injection mortar FIS EM is approved for water-filled boreholes according to anchor theory, which makes it suitable for this application”, explains Bernd Wetzel, fischer Application Engineer. The boreholes with a diameter of 25 cm were therefore successfully filled with the injection mortar while the concrete was secured with the system. “Further advantages include the fact that alongside other system components the solution is particularly suitable for reinforcement connections of between 8 to 40 mm in diameter in concrete, therefore providing high load values”, the certified civil engineer adds. “The system temperature of up to 5° is also suitable for underwater installation”.

The subsurface of the construction did not consist of standard concrete. Bernd Wetzel carried out a series of preliminary tests together with employees of the contracted firm Xaver Lutzenberger GmbH & Co. KG. The experts examined the load-bearing capacity of the system consisting of injection mortar FIS EM, reinforcement bar and concrete using a rock anchor testing device set at a tensile force of 200 kN, which was determined in coordination with the engineering firm Konstruktionsgruppe Bauen AG. In order to do this, employees of the Lutzenberger

GmbH took a boat out above the fastening points where anchors had been placed. They lengthened the rods by using a reinforcement sleeve as a connection and attached a steel pipe to it. The testing device was attached to this pipe and was then pulled on.

The FIS EM is heated before its installation in order to prevent the risk of it becoming viscous through the low water temperate. The commercial divers of Kerlen Taucher GmbH who created the boreholes then informed Bernd Wetzel by radio if they required any further mortar. fischer's expert then responded by injecting the mortar through a tube, enabling the construction divers to fill the boreholes. The weir facility was successfully drained and reinforced using this procedure. "In general we only use fischer products for underwater installations", Karl Kerlen from Kerlen Taucher GmbH emphasises. "By using the fischer injection mortar system in order to strengthen the reinforced concrete wall in the Wertach river we can be absolutely certain that it will withstand the extreme conditions".

The result was a robust reinforced concrete wall that enables the restoration and continued functionality of the 1960s facility, and therefore the generation of green electricity through water.

Image captions:

Image 1
Submerging with fischer: in order to be able to carry out the concrete restoration in the lower part of the Biessenhof hydropower facility, the water level first had to be lowered through a reinforced concrete wall. This meant diving under in order to secure the new “levee” with fischer injection mortar FIS EM.
Image: fischer

Image 2
fischer Application Engineer Bernd Wetzel was informed through a radio set when the construction divers required new injection mortar to fill the boreholes.
Image: fischer

Image 3
As soon as the divers required new injection mortar in order to fill the boreholes, the fischer Application Engineer Bernd Wetzel injected it through a hose to reach the underwater construction divers.
Image: fischer

Image 4
Green electricity from water: the hydroelectric power station in Biessenhofen allows natural resources to be used to the benefit of both people and the environment.
Image: Konstruktionsgruppe Bauen AG, Eva Bartussek

Image 5
Diving to new depths for installations: concrete restoration has made the Biessenhof hydroelectric power station fit for the coming generations. These requirements are met by a wall that dams up the river and is reinforced with fischer injection mortar.
Image: Konstruktionsgruppe Bauen AG, Eva Bartussek

The fischer group of companies

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fischer automotive systems manufactures high-quality parts for car interiors. The company is highly competent in the plastics processing segment and is an important partner for the automotive industry. fischer automotive systems produces air vents, cup holders, trays and multi-function components.

fischertechnik is active both in the construction kit and in the educational toy sector. As one of the last toy makers, fischertechnik develops and produces exclusively in Germany.

fischer consulting evolved from the competence and skills developed in the company itself, among these the fischer ProcessSystem with its central aim of permanent and continuous improvement for the ultimate benefit of the customer. fischer consulting advises small and medium-sized businesses, government agencies and major companies on their way towards lean and efficient processes.

LNT Automation develops and manufactures custom electronic solutions. The company also develops, produces and distributes custom and capacitive touch systems such as multi-touch solutions made of glass and the corresponding controller units. All electronics are manufactured in-house.

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