



Site preparations –
the situation above ground

RAG shaft drainage: installing DN 1000 GRP pipes for a mine water pumping system

One of the most pressing tasks associated with the decommissioning of RAG's disused collieries in the Rhine/Ruhr, Saar and Ibbenbüren coalfields, where the coal seams have been worked in some cases for 100 years or more, is to establish a systematic routine for collecting and managing the mine water that continues to build up in the abandoned workings. This operation will at the same time prevent any further ingress of water into those areas that are still in active production and, following the ultimate closure of the industry, will allow the water to be put to further use or discharged into water courses.

This de-watering programme also brings work for the specialist mining contractors. The joint venture partnership of THYSSEN SCHACHTBAU GMBH and Deilmann-Haniel GmbH was commissioned to install protective pipe systems (cladding pipes) for the submersible pumps that are required to raise mine water to the surface of the RAG-operated Rossenray 2 shaft.

Crane track is used for moving
the pipes into the pithead
building

■ Using GRP cladding pipes

In-shaft cladding pipes are mainly constructed from GRP material (glass-fibre reinforced plastic). After the cladding pipes have been installed the shaft is completely filled with a cohesive material so that the submersible water-extraction pumps can be installed, operated and removed within the protection afforded by the pipes. The cladding pipes will ultimately serve as a lost formwork for the maintenance of the pumping system.





Pipes being transferred from the crane track to the transport winch

■ Installation of GRP cladding pipes and assembly of 2 × 700 m-long pipe runs

Rossenray 2 shaft is part of West colliery in Kamp-Lintfort. The mine ceased production at the end of 2012 and the site has now been chosen as the back-up station for all RAG mine drainage operations on the left bank of the Lower Rhine. The

role of the back-up station is to come into action when needed, such as in the event of a breakdown at another mine pumping station, to drain the water inflow in order to prevent an unacceptable rise in the underground water levels in the disused mine workings.

The mine water drainage operations being undertaken in Rossenray 2 shaft at West colliery called for the installation



Cladding pipes in place with support brackets fitted

of two GRP pipe runs each 700 m in length and 1,000 mm in diameter. The individual pipe sections measure 6 m in length and feature socket ends with a coupling sleeve and rubber collar to provide an effective seal when the system is in place. The pipes are to be installed from the bottom of the shaft upwards and to be attached using at least one pipe bracket at each of the existing shaft buntons to prevent kinking and help maintain the stability of the pipe run. A pressure test is also to be carried out on the system after installation.

As part of a preliminary study three different proposals were submitted for the pipe installation work and one acceptable concept was then developed on this basis, in consultation with RAG, Herne, the relevant mining authorities and Deutsche Montan Technologie, Essen, (DMT). After the site had been prepared and equipped and a temporary scaffold in the shaft cellar removed, work could start on the installation of the pipe runs using the following method of operation:

The crane track already in place at the shaft site is used to transport the individual sections of pipe into the shaft hall, where they can be taken up by the pipe transport winch. This winch then delivers each pipe to its final installation position in the shaft. This transport operation is accompanied by the existing shaft conveyance (cage unit). A radio system, or alternatively a mechanical knocker line, is used to send signals to the transport winch. Here the accompanying cage must always take up a position above the manoeuvring pipe as safety regulations prohibit any work being carried out beneath suspended loads.

A working platform, which is attached to the shaft cage and equipped with overhead protection and a fall arrester system, is then deployed to serve as a standing area for the fitting team. As soon as each individual pipe section reaches its installation level it is taken up by a second suspension system operating from the winch, guided into the exact

fitting position and inserted into the coupling sleeve of the pipe beneath.

The transport rope, now relieved of its load, is then accompanied by the cage back to the top of the shaft and a new work cycle can begin. The relevant signals are once again sent by radio and/or knocker line to the machine operator at the installation winch, who has already switched over from his previous position manning the transport winch, so that there is no risk of both winches being operated at the same time.

As a result of changes to the loading specifications, which have been introduced for safety reasons on a recommendation from expert bodies and mining authorities, additional support plates are now being fitted to the pipe holders and shaft buntons so that the structure is now better equipped to counteract any horizontal forces that may arise when the shaft is being filled.

■ Summary and suggestions for the organisation of future projects

The described method of operation for the mounting and installation of such a large quantity of GRP pipes, which were fitted in a single session working upwards from the bottom of the shaft, does have its advantages. These include faster fixing times and the fact that the mountings and fixing points for the GRP pipe runs can be of a more lightweight design than when steel pipes are used.

The basic prerequisite is to have a thorough understanding of the general conditions and operating environment inside the shaft. And in this respect the devil is very much in the detail: the project calls for detailed planning, a systematic static calculation of the structures involved, high-quality manufacturing standards for the pipe holders, mountings and fixings with adherence to the tightest production tolerances, and most importantly of all the availability of an experienced team of shaft fitters to ensure that the installation work is carried out reliably and accurately. Provided all these requirements are met, a GRP shaft pipe system of this kind can be mounted and installed quickly and without interruptions.

It is also beneficial if commissions of this type are executed by a single contracting firm, as this avoids having to interact with other suppliers and subcontractors.

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