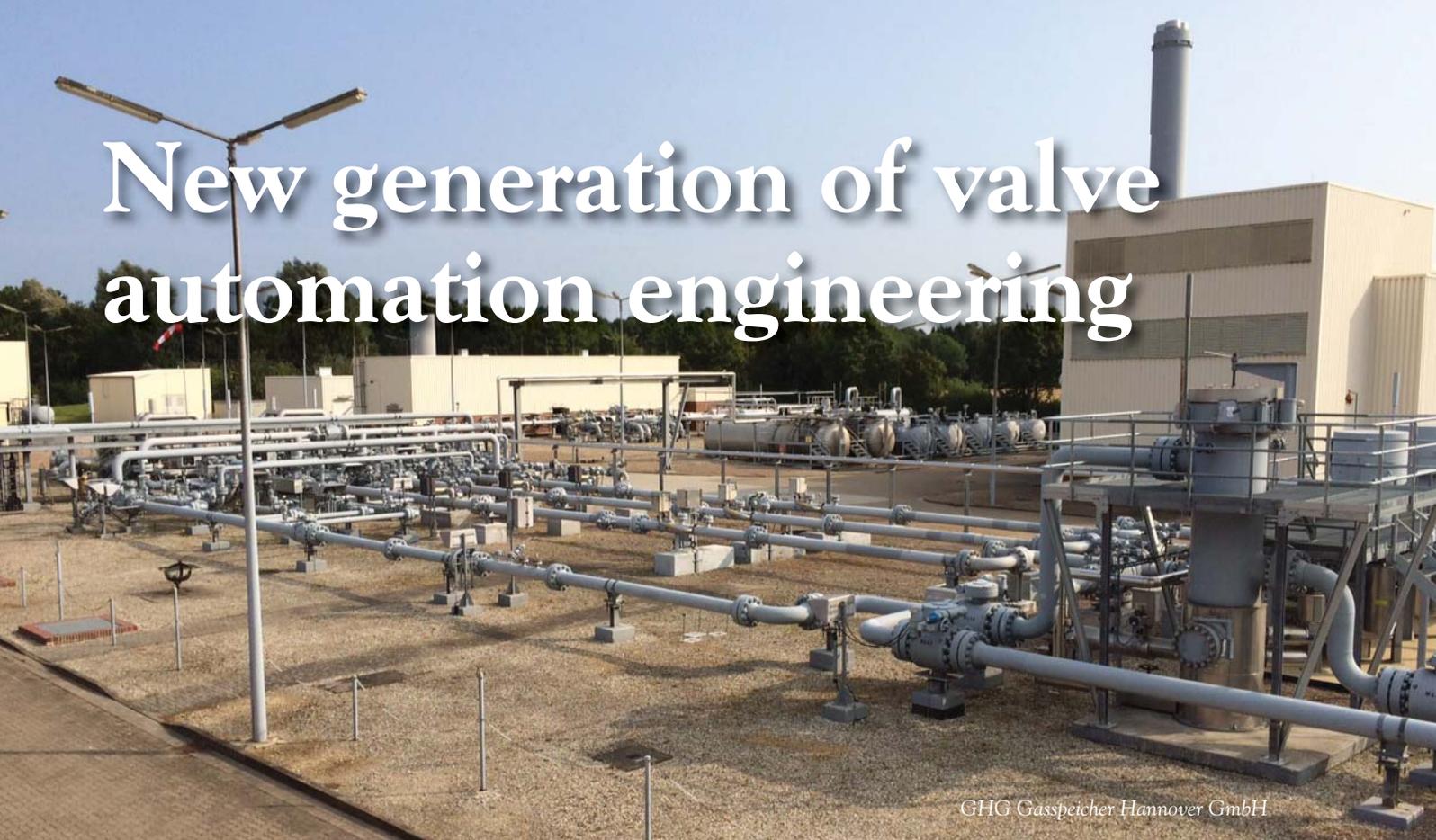


New generation of valve automation engineering



GHG Gasspeicher Hannover GmbH

Since 1982, the company Gasspeicher Hannover GmbH has been operating the natural gas underground storage in Ronnenberg-Empelde (Lower Saxony, Germany). The partners of the joint enterprise are the utility companies Stadtwerke Hannover AG and Erdgas Münster GmbH. The company was founded in 1977 to implement the underground gas storage in the South-West of Hannover (Germany). The operating staff of the underground storage is provided by Stadtwerke Hannover. Promotion of the underground storage volume on behalf of the partner Stadtwerke Hannover AG is taken over by enercity Speichervermarktungsgesellschaft mbH (eSG). The partner Erdgas Münster GmbH uses their volume capacity to compensate domestic production.

By Joachim Toffolo, DREHMO GmbH and Frank Aumann, Gasspeicher Hannover GmbH

Around 80 valves automated by electric actuators are implemented for plant control. Medium flow is remote controlled from the control room, depending on the requirement of operation. Underground storage facilities, compressors, gas drying, preheating, measurement paths and manifolds are regulated by automated valves.

Previously used actuators

During the construction phase of the plant, explosion-proof actuators of type DC were ordered from AEG/EMG DREHMO. These devices excel by their robust design and were homogeneously available for all valves to be automated.

To allow manual operation directly at the valve, the actuators were equipped with the optional so-called local controls.

To avoid downtimes during service, which was previously governed dependent on

seasonal requirements, decision was taken at an early stage to charge the manufacturer with annual inspections.

This allowed a virtually undisturbed service for more than 30 years.

The time for action was ripe

With the introduction of the ATEX directives in 2002, the production of the explosion-proof devices of type DC had to be discontinued. As a matter of fact, spare parts delivery had finally to be stopped in 2014 after more than 40 years of production and support.

This development was paired with necessary modifications with the scheduled and commenced extension of the gas storage to a total of 5 underground storage facilities. As a consequence, project partner ILF was awarded the task to plan the plant modification and proceed with DC actuator replacement.



To maintain the service continuity, the initial plan was to merely replace the actuators and to continue using the existing valves. However, the long-term use of the valves and the changing requirements for higher frequency of underground storage operation, quite a large number of valves showed tightness leaks and wear.

This led to the necessity to either retrofit or replace the previous valves. It became evident that the changing requirements had to be taken into account to avoid high maintenance costs for the valves.

As a result of all these reflections, the decision was taken to replace the majority of the mainline block valves and to additionally equip them with bypass valves. For this, further actuators had to be integrated into the electrical and process control system.

x-matic selection

Since the existing control station including switchboards had been completely replaced as recently as 2010, many actuators were to be replaced by similar types. On the other hand, additional actuators had to be installed. To this end, devices with integral controls should be implemented to minimise additional requirements for new switchboards.

Due to the proven service experience with the AEG/EMG actuators, the successor DREHMO GmbH was awarded the contract to provide the new products of which some are already in mission with equally positive feedback. DREHMO were able to supply the compatible s-range variant for standard applications as well as the x-matic range with integral controls.

Equipped with state-of-the-art sensor technology and user interface with graphic LCD, x-matic actuators allow actuator data setting from the outside. It is no longer required to open flameproof enclosures. Since operation durations are expected to be long term and outer switching elements and their sealing always presents considerably challenges, x-matic operation is made by means of so-called magnetic pins. This variant does not require openings and movable outer parts. Therefore, permanent outside mission even under harsh conditions (e.g. ice and snow) is considered trouble-free. Ageing sealings and ingress of humidity are issues of the past.

The modular design of DREHMO actuators easily allowed offering a lockable

handwheel as requested by the customer. Modern sensor technology guarantees continuous recording and feedback on valve position and torque applied. Data logging for diagnostics on actuator and valve are possible by means of the micro-controller. In future, it will be possible for the staff to easily and swiftly identify the causes for service failures.

Implementation



After a planning phase of approximately 18 months, the implementation phase was scheduled for mid 2014. During the planning and procurement phase, many details had to be clarified and schedules to be agreed on. Among others, the operating times and motor power of actuators had to be harmonised, to limit interventions on the existing switchboard to an absolute minimum. The way to integration of the new bypass valves into the electrical and process control system had to be paved. Procurement of electric actuators was dealt with as usual, in combination with the new valves. Common procurement saved additional interfaces and simplified project management. The detailed specification

warranted that the actuators were supplied with required equipment in the correct version. On 22 July 2014, the underground gas storage was taken off-line for retrofitting. The valves leading to the high pressure network as well as the station entries of the underground storage facilities (max. pressure of 203 bar) were removed and the pipes sealed. The station network was flushed with nitrogen, to ensure free intervention on the plant.

Five teams of the contractor for pipework were working in parallel to accomplish installation of 115 new valves as well as the retrofitting and new erection of pipework within the framework of 10 weeks.

Electrical and process control system interventions were carried out in parallel and adaptations had to be flexible due to certain changes relating to the schedule.

Conclusion - outlook

Thorough preparation and planning as well as considerable support by suppliers and service providers made it possible to accomplish the project on time. The underground gas storage was available for service at the agreed time (end of September).

Replacement of valves and actuators as well as the introduction of the bypass valves will considerably increase reliability, safety and availability of the installation and keep maintenance cost to the very minimum. Automated operation of valve groups including bypass and mainline block valves will significantly contribute in reducing the wear caused by pressure differences during switching of mainline block valves. The slightly extended switching time by pressure compensation across the bypass valves does not impair operation.

About the authors

Mr. Joachim Toffolo has 20 years of experience in all kinds of valve automation with electric actuators. He started in 1995 as a Regional Sales Manager near Hannover. From 2011 to 2014, he was working as Domestic Sales Manager at DREHMO Valve actuators. Since 2015 he is one of the Oil & Gas Sales Manager Germany for the AUMA group. Mr. Toffolo is a graduate engineer in automation technology and has received vocational training in energy electronics. He can be reached at Joachim.Toffolo@drehmo.com



Mr. Frank Aumann has worked at GHG since 2011 after studying electrical engineering. He was, together with Mr. Wilke Schiller, responsible for the EMSR part in this great expansion and modernization project. Among his priorities were responsibility for the energy supply of the new facilities, selection of valve actuators, clarification of the interfaces for process engineering and automation technology etc. The valve actuator exchange was supervised by him together with the engineering company ILF and covered the design of the inquiry documents, the commercial management up to the assembly and commissioning.