

ADAM-4000 DAQ Series for Berlin's Tunnel Construction Project

Monitoring of the building progress with the tunnel construction with simultaneous entry, archiving as well as logging of the resulting process data.

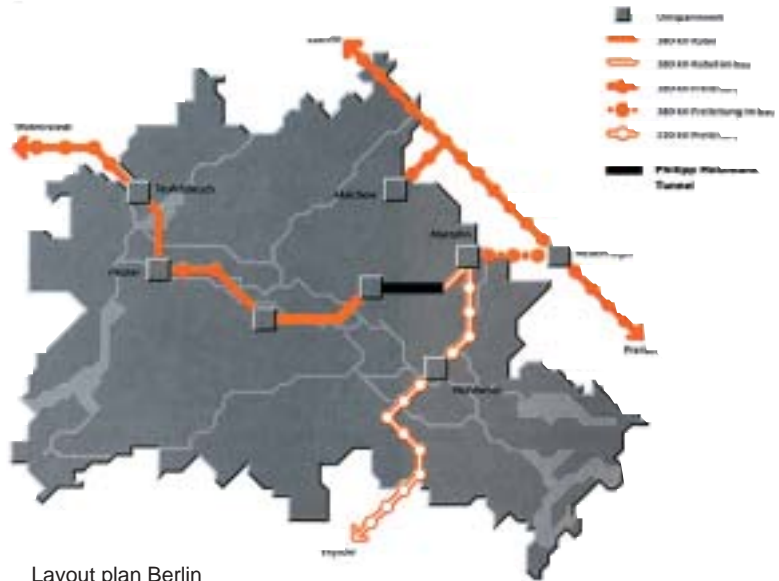
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INTRODUCTION

The building of a 380-kV overhead line with a length of 9 km of the city boundary in the north of Spandau to a transformer station in the center, planned by the power supply firm Bewag AG in Berlin, encountered substantial resistance in the policy and with citizens' initiatives. This led to the fact that by planned 9 km in the final result only 1 km is celestially implemented - 8 km are passed through from transformer station to transformer station in tunnels under Berlin. This large-scale project was distributed on several builders - one of them is the Philipp Holzmann AG. The subrange, which is implemented by the Philipp Holzmann AG, covers one approx. 3 km long tunnel, which leads from the Landsberger avenue to the transformer station Friedrichshain (near the Potsdamer place).

SYSTEM REQUIREMENTS

With the tunnel construction several work procedures always repeat themselves: During the drilling process the drilling heading is pressed by several propulsion presses under high pressure against the soil. Afterwards with high pressure mortar is pressed into the soil, in order to stabilize it additionally. As the third level the building of a ring takes place. Here the propulsion presses are brought in and a



Layout plan Berlin

ring from several individual concrete segments is built. Depending upon the arrangement of the segments a turn or an inclination of the tunnel direction can be achieved. Now the propulsion presses are supported against the last developed ring again and the next

drilling process starts. All process data, e.g. pressure of the propulsion presses, propulsion rates, air consumption, mechanical handling capacities, operation hours etc.. are monitored, logged and archived.

SYSTEM DESCRIPTION



View into the tunnel and to one of the propulsion presses

For entry of the resulting measured values ADAM modules of the company Advantech are used, whose analog and digital signals are led out from the tunnel over a RS485 bus system with inserted repeaters, length up to 2,5 km, to the monitoring PC. Two analog input modules ADAM 4017 and two digital input modules ADAM 4052 are used for the recording of measurement, as well as two repeater modules ADAM 4510 approx. after every kilometer tunnel length. The modules are closely accommodated

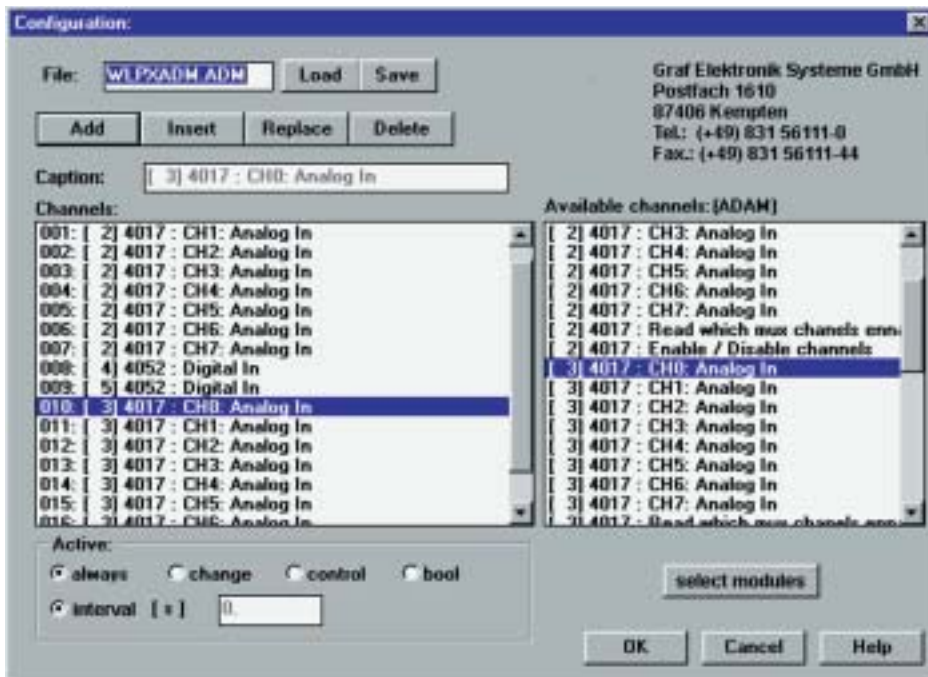
behind the drill with the control post. As signal line a twisted pair of veins is used, which is pulled tight behind the propulsing part together with the telefon line. The measured values are registered, archived and logged by the process visualization WinLab® of the company Graf Elektronik Systeme GmbH. 16 analog signals (4-20 mA) and 14 digital signals are registered, whose upper and lower bounds, alarm bounds and designations can be changed 'online'. During the propulsion (drilling operation) the entry of the resulting values takes place just as automatically as archiving and logging. During the recording additionally all maximum values and arithmetic average values of the registered signals are calculated. In stop mode (drilling stop) a "deadlock monitoring" again automatically registers, logs and archives the most important signals e.g. pressure values of the media.

CONCLUSION

The Philipp Holzmann AG attached great importance to the reusability and the expandability of the created software with this project. This is particularly possible by the easy configurableness of the development environment WinLab® in interaction with the appropriate hardware drivers. Via these drivers the respective hardware (in this case the ADAM modules) can be accessed very easily by simple configuration dialogs. Thus it is easily possible also for the end-user to execute modifications directly locally and to adapt the



The control post



Configuration dialog of the WinLab® ADAM driver

system thereby to modified conditions . The decision of the Philipp Holzmann AG to favor the process visualization WinLab® in interaction with the ADAM modules fell for the following reasons:

- Efficiency and reliability of the process visualization WinLab®
- Efficiency and reliability of the used ADAM modules
- Almost unlimited length of the data communication over the RS485 bus system
- Simple configurableness of the ADAM modules
- Expandabilities / reusability of the created software
- Conversion/programming of the application directly by the manufacturer
- Inexpensive complete solution ■