

Arosa, Switzerland Excavation in Unstable Slope

In-Place-Inclinometer and Tiltmeters



The Arosa Schafisgade project includes construction of three houses with each six luxury apartments. The houses are located in a potential unstable slope. During excavation work adjacent houses above the new built ones had to be monitored geodetically. Between the new excavation and the existing houses borehole inclinometers had been drilled and monitored to detect level and magnitude of soil deformations long before start of construction work. The excavation was carried out within a shotcrete retaining wall with soil nailing.

For geodetic and geotechnical monitoring the Swiss company Meisser Vermessungen was contracted. Sisgeo International was appointed as a supplier for the geotechnical monitoring systems. Prior to starting excavation work the two existing houses were equipped with digital Tiltmeters to monitor the houses for change in inclination. Two boreholes with inclinometers, situated uphill of the excavation, were then equipped with in-place-inclinometers. In both boreholes series of six digital and

biaxial probes, each 2m long have been installed. The tiltmeters and the in-place inclinometers are connected to Sisgeo's OMNIALog data acquisition system. This unit, equipped with a router and GSM/GPRS-modem, sends the retrieved data regularly to a ftp-server. A project website, especially setup for this application, refreshes the displacement graphs and the alarm status automatically.

In addition geodetic monitoring of the houses and the retaining wall is carried out with a robotic total stations and vibration monitoring was operated during a short critical construction phase. Also these results are included within the monitoring project website. Selection of the instruments for monitoring this project in Arosa has proved to be very effective and reliable. The houses showed so far clear but still small deformations and also the in-place-inclinometers showed clear response to excavation work. Sisgeo's anchor load cells have, compared to other load cells, the big advantage of a relative small height of only 40mm

(without the load distribution plate) and an outstanding good performance to accuracy and robustness.

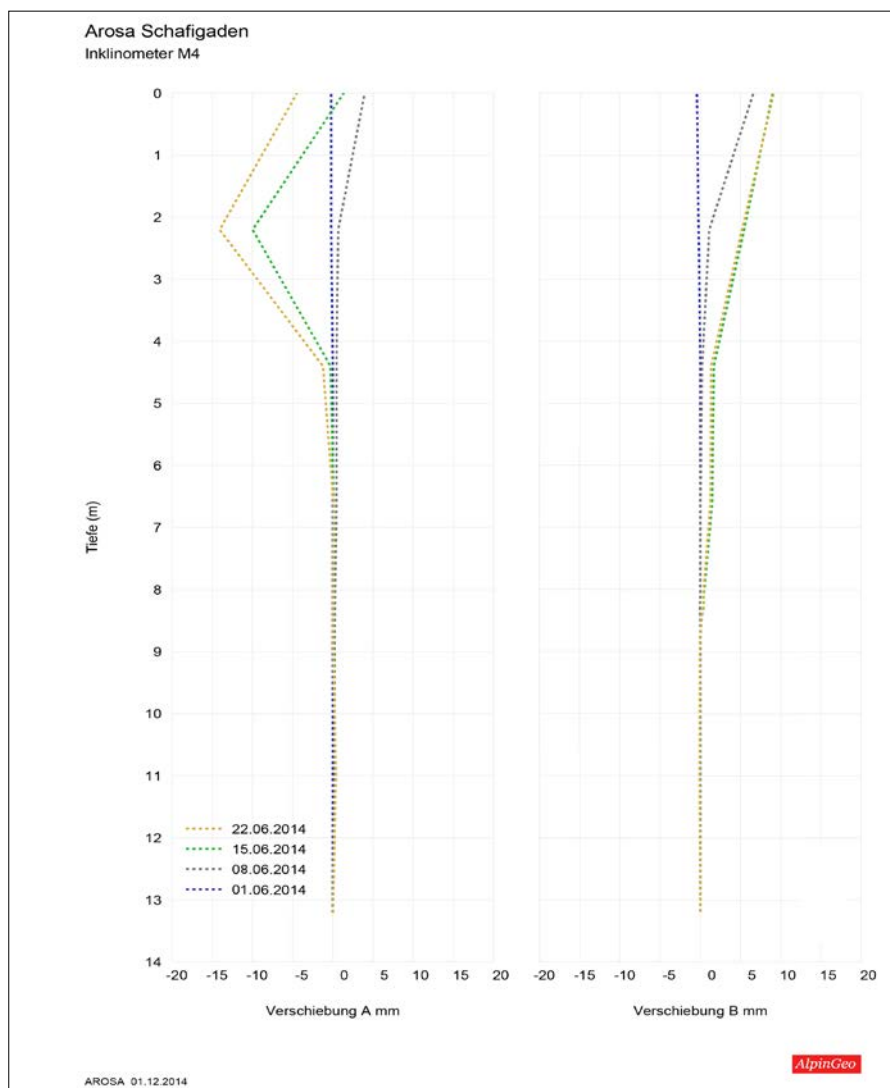
Most of the anchor load cells are measured with the portable readout / datalogger the New Leonardo. This readout device can be used to read and operate all Sisgeo's analogue and digital sensors. Also sensors of other manufacturers can be operated. The prominent feature of this unit is, that it works as a portable data logger. A working list with all the sensors name and sensor configuration is prepared (SMART manager software) on your office pc and downloaded to the New Leonardo. In the field the readings are then taken based on the working list, stored and directly validated. After completion of all the instrument readings data is transmitted via Bluetooth or USB-port to the office pc and are then integrated into the data base.

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Arosa Schafisgaden excavation work



Multiplexers installed to connect several anchor load cells (up to 24 channels can be operated per unit) greatly optimize the readings. On the New Leonardo just select and connect the specific multiplexer to take the readings of all connected sensors within a few seconds.

Anchor load monitoring, together with geodetic deformation monitoring and inclinometer readings is one of the important physical quantity to control so to ensure stability of the excavation retaining walls. Sisgeo International is happy to have been contracted as supplier of Sisgeo's anchor load cells.

LINKS:
MEISSER VERMESSUNGEN
SISGEO