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Da Nhim reservoir dam.

Power station facelift

Hydrological measurement network delivered to Da Nhim, Vietnam

The Da Nhim power station is located approximately 250 km northeast of Ho Chi Minh City. The station generates a maximum power output of 160 MW with four Pelton turbines. The construction of the power station began in 1960 and was completed in 1964. After 38 years of operation, deterioration in reliability and performance made major upgrades necessary for the various facilities of the original Da Nhim power system.

Transporting equipment to an installation site.

Reliable partners for a comprehensive solution

Electricity of Vietnam (EVN) is a state-owned corporation that operates in the areas of generation, transmission, distribution and sales of electric power. They chose Vaisala, together with a Vietnamese partner, to deliver and install a hydrological data acquisition system and warning network for the upgraded facility.

The turn-key project included everything from site surveys to installation, factory acceptance testing, as well as site acceptance testing and training. The manufacturing and factory acceptance testing were carried out in late 2005. Delivery and installation of the systems took place in the first half of 2006. Training was completed in autumn 2006.

Challenging landscape

The installation landscape was very challenging. The region is mountainous and has great altitude differences. Rivers and steep hills make transportation difficult. Many sites are accessible only by foot. Hot and humid climate tests the reliability

Site Acceptance Testing in progress.

Water level station radio site.

of the equipment. Local knowledge was essential for tackling the demanding environment.

The project site included the Da Nhim power station, its intake dam, the catchment area of the intake dam reservoir as well as its downstream. The hydrological network contains 11 hydrological measurement stations, a combination of a digital UHF-radio network and a leased line modem network for data collection, an analog UHF network for voice, and two Vaisala MetMan™ Network Software MM400 servers for data collection and processing. MetMan™ WebView is used for displaying the data.

The measurement stations are solar powered Vaisala HydroMet™ MAWS 110 or MAWS 301. They measure the water level and precipitation in two river basins leading to the Da Nhim reservoir. The water level is measured from four locations: both inlet rivers, on the reservoir and on the outlet river of the reservoir. Precipitation is measured from seven locations around the river basins.

The water level of the rivers is measured with submersible relative pressure sensors. The reservoir water level is measured with greater accuracy with the Vaisala Absolute Shaft Encoder QSE104. Tipping bucket rain gauges are used for precipitation measurement. The MAWS stations perform a set of quality checks for each measurement before releasing the results to further processes.

The data collection system for the measurement stations is installed in the reservoir control building from where the network spreads more than 30 kilometers across mountainous terrain. Measurement data from eight remote measurement stations is collected automatically via a digital UHF-radio network. A leased line modem network is used to collect data from three stations which are located at the dam.

Local knowledge was essential for tackling the demanding environment.

A data collection server automatically collects data in preset intervals and downloads this to an Oracle database. The latest observation data is processed and stored automatically in the MetMan™ system for daily, weekly, monthly and yearly statistics. In addition to the measured values, the MAWS measurement stations provide an array of additional information to the users of the network. Real-time information such as measurement data, access control, radio signal strength and battery voltage are automatically monitored. Real-time data allows the power company to monitor and control the plant processes more accurately.

The collected data is routed from the data collection server to the back-up server at the power plant via a fiber optic link. The back-up server is used to back-up and display the data. It can also be activated to take over the data collection server's data collection tasks. Periodical reports from data in the Oracle database can be produced semi-automatically by using the Crystal Reports tool.

Operation-critical system requires accurate data

In an operation-critical system like this one, the availability of accurate data has been secured in multiple ways: quality checks are carried out at the measurement stations, and data integrity is checked with check sum algorithms. The availability of radio transmission is continuously monitored and controlled. The radio signal strength of each station is available in real-time for the operator.

If failures are detected, the data collection server automatically switches to back-up radios. Back-up radios are used at the most critical points of the network: the data collection server at the dam and at the radio repeater station. The reliable Vaisala systems have ensured excellent data availability in all environmental conditions. ■