ABB MEASUREMENT & ANALYTICS | REFERENCE CASE STUDY

Level Measurement – LLT100 Application Success

Open channel flow measurement with LLT100

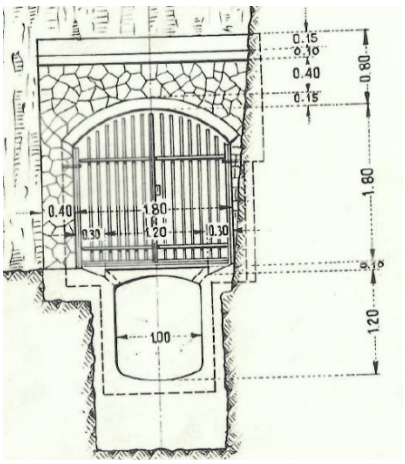
Flow measurement in restricted spaces and strong turbulence

Measurement made easy

Introduction

The purpose of the measure in this application was to ensure the minimum vital flow that must be guaranteed downstream of a dam to allow for natural ecological integrity. The measurement had to be carried out in a tunnel channel, almost completely subjected to the paving of the tunnel itself, with only one accessible point near the outlet.

In normal operating conditions, when the measurement is of fundamental importance, the level remains almost stable around 22 ... 28 cm from the bottom of the channel. In case of need, such as to reduce the lake level following heavy rains, the channel can considerably increase the flow rate (therefore the level) until the dam locks intervene.



01 Drawing of installation

01

02 Front view of installation

02

—
03 LLT100 laser level transmitter installation

—
04 Lens detail after 5 months of operation

—
05 Dam where the laser level transmitter is measuring the level

Challenge

This application had to be installed in the final part of the canal, as it was the only accessible point and sufficiently distant from the water collectors located at the beginning of the canal (bottom of the tunnel). Due to the proximity to the runoff point of the channel, the turbulence was very strong.

Another challenge was that any instrument that protruded could not be installed inside the channel (such as an ultrasonic sensor or an open wave radar) because, in case of flooding of the channel, there would be the risk of destroying the sensor.

ABB solution

The solution was to make an adapter plate to be installed in place of an inspection grate (see photo).

—
03

In this way there are no parts that protrude inside the channel and even in the event of flooding / very high level of the channel, there is no risk that the sensor can be destroyed. Given the very limited spaces, the working range remains significant up to about 1m of level, then it is no longer possible to guarantee the measurement. The heated lens and strong air currents in the channel and tunnel help keep the lens free of condensation.

The following configuration was used for the test:

Process Variable

Process Value:	Level
Level Unit:	cm
Upper Range Value (URV):	120 cm
Lower Range Value (LRV):	0 cm

Application

Measurement Mode:	Standard
Sensor offset:	0 cm
Vessel Height (URP):	132 cm

PV Setup

Damping:	10 s

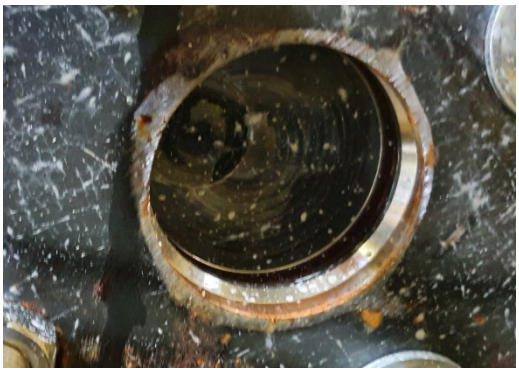
Filtering

Measurement Mode:	Standard
Median Filter enable:	Enabled
Median Filter Size	5

Level-to-flow compensation is done externally via a DCS.

During the observation periods the amplitude value varied between 30% and 55 ... 60% but there were practically no measurement losses.
We advised the customer, if necessary, to enable the "No measurement period" parameter by setting it to values around 10 ... 20 seconds.

Below is the photo of the lens after 5 months of use without ever having been cleaned.



—
04

Conclusion

The customer declared himself satisfied and purchased the laser for this measurement and two other units that he plans to install on the lake level and inside a service well.

—
05

—

abb.com/measurement

—