



Home of the Acoustic Scintillation Flow Meter

Further Comparison Tests with the ASFM

After the very successful blind comparison tests at Kootenay Canal, the ASFM has been involved in three more comparison tests in the past year. Two of these will be the subject of papers to be presented at Hydro 2012 in Bilbao, Spain this October.

1) Turbine acceptance tests at Frieira Hydro Power Plant, Spain

ASL AQFlow was contracted by Gas Natural Fenosa, Spain to assist in the operation of their ASFM Advantage™ in Unit 2 at the Frieira Dam in June 2011. Due to the success of the ASFM in establishing the operational efficiency of existing turbines at their Velle, Frieira, and Castrelo plants on the Mino River in Spain, in 2007, company personnel stipulated in their contract for replacement runners at these three plants, that the ASFM would be used again in the field acceptance tests. In this case, Gas Natural Fenosa decided to make flow measurements by the current meter method also.

The Frieira plant has two Kaplan units, with nominal flow of 320 m³/s and a net head of 24.5 m. The ASFM was equipped with 15 acoustic paths in each of 2 bays, that were mounted on removable frames on the walls of the intake, as the plant did not have stoplog slots available for the ASFM mounting frame. The ASFM was mounted downstream of the gate slot, and the current meters were operated on travelling frames upstream of the ASFM, and downstream of the gate slot also. The results of the 2 methods were within 1% and will be discussed in the paper to be given at by Dario Conzalez Salgado, Gas Natural Fenosa, at Hydro 2012 Bilbao.



2) Comparison Flow Measurements at CNR's Vaugris Dam, France

AQFlow assisted CNR in operating their previously purchased 1-bay, 30-path ASFM Advantage in the intake of Unit 4 at the Vaugris Dam on the Rhone River, France, December 2011. The ASFM was mounted on an open frame fitted into the gate slot. The ASFM measurements were used in a comparison test along with propeller type current meters and ADCPs. The measurements were done as a blind test - the discharge results were computed without knowledge of the results obtained from the other methods.

The Vaugris Power Station is located at Vienne, Isere, France, has a design capacity of 72 MW, and is owned by Compagnie Nationale du Rhône (CNR). It is equipped with four bulb turbines of 6.25 meters runner diameter and delivers 18 MW each under 6.70 meters head. The maximum discharge of each unit is about 350 m³/s.

These comparison measurements are part of the PENELOP2 project that has been under way in France since May 2010 and will continue for a total of 5 years. The goal of the PENELOP2 project is to substantially improve performance at the low-head hydropower schemes in France. PENELOP2 is a collaborative effort of leading French organizations in hydraulics and hydropower, including Alstom Power, CNR, Sogreah, LEGI (Grenoble INP), InVivo, Actoll and JKL, is financed by the FUI (Fond Unifié Interministériel) and led by TENERDIS, the renewable energy competitive cluster.
[PENELOP2 website <http://penelop2.com/>]

3) Slapy Hydro Plant, Czech Republic

The third comparison test was done at Slapy power plant, on the Vltava River in the Czech Republic, and was between the ASFM (operated by EdF) and the pressure-time method (operated by OSC a.s.). The data are currently being analyzed by EdF.

The ASFM mounted on a movable frame, operated by EdF at Slapy HPP, Czech Republic



Investigation of the Performance of the ASFM when Turbulence Levels are Low

AQFlow is continuing to provide support to the EdF/ Hydro Quebec PhD research project. The PhD project aims at improving the discharge estimation when hydraulic conditions are not ideal for acoustic scintillation measurements, as well as providing a better understanding of the effects of sources of interference which can be encountered during the measurement process and can cause inaccuracies in the velocity estimation. Ion Candel, PhD candidate, is currently investigating methods to improve ASFM performance under conditions of low turbulence. This will be the subject of a poster paper at HydroVision 2012.



Technical Support for the PTC-18 and IEC Code Committees

Both the IEC 600041 and ASME PTC-18 code committees are currently in the process of incorporating guidance on flow measurement in intakes into the next editions of their respective publications. This represents a major step in the development of these codes, as no such guidance has been provided for the owners of low-head plants until now.

ASL AQFlow has continued to participate in the code committee meetings for the PTC-18 and IEC 600041 codes. AQFlow is providing information and helping to write draft sections for the proposed inclusion of acoustic scintillation. The PTC-18 meeting was held in Albuquerque, New Mexico, May 2012 and the IEC (International Electrotechnical Commission) met during the IGHEM 2012 conference in Trondheim, Norway.

Upcoming Conferences and Exhibitions

Papers to be presented:

HydroVision International 2012

Louisville, Kentucky
July 17-20
Booth # 1739



- 1) **Investigation of the Performance of Acoustic Scintillation Flow Meter when Turbulence Levels are Low**, poster to be presented by Bertrand Reeb, EdF, Ion Candel, EdF, Gilles Proulx, Hydro Quebec
- 2) **Intake Flow Measurement at Lower Granite Power Plant by Acoustic Scintillation: Results and Comparison with Winter-Kennedy and Model Test Data**, poster to be presented by J. Buermans, ASL AQFlow Inc., Canada

HydroTurbo 2012

Brno, Czech Republic
Sept 25-27



Turbine Flow Measurement with the Acoustic Scintillation Flow Meter in Intakes, to be presented by Josef Lampa

Hydro 2012

Bilbao, Spain
Oct 29-31
Booth # 108



- 1) **Turbine acceptance tests at Frieira HPP, Miño River, Spain with Acoustic Scintillation Flow Meter**, to be presented by Dario González Salgado, Gas Natural Fenosa, Spain
- 2) **Assessment of a CNR Bulb turbine flow: comparison of acoustic scintillation, ADCP, Winter-Kennedy tests with the current meters method (PENELOP2 project)**, to be presented by Pierre Roumieu, Compagnie Nationale du Rhône

Our parent company, ASL Environmental Sciences, offers a range of related services and products for other hydro applications, such as **flow surveys** and **numerical simulations** in forebays and tailraces and **remote sensing** including mapping and monitoring of watershed land use/cover, aquatic vegetation, and water quality and temperature.

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