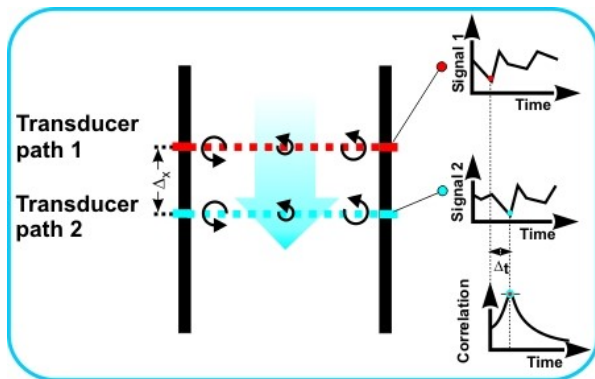
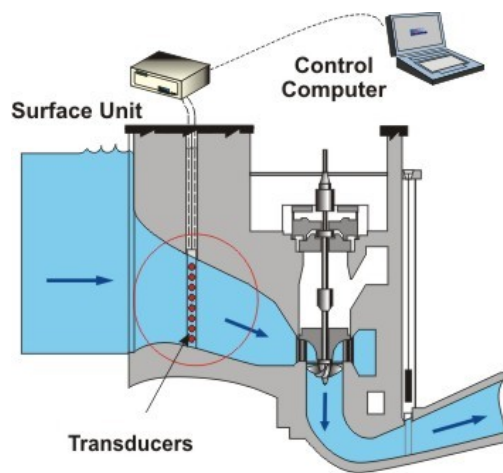


The acoustic scintillation method for measuring turbine discharge, used by ASL AQFlow's [Acoustic Scintillation Flow Meter \(ASFM\)](#) has been mentioned in the latest American Society of Mechanical Engineers Performance Test Code (ASME PTC 18-2020) for Hydraulic Turbines and Pump-Turbines. Although the method has not yet been adopted into code, it is being evaluated for future code releases. Acoustic scintillation is considered to be a permissible technique to measure hydroelectric turbine discharge when those testing understand and agree on its use, or use this technique in conjunction with a code-approved method. A detailed explanation of how the method works and guidance on its use appears in the nonmandatory appendix C section of this code document.

The ASME was established in the 1880s with a goal of establishing standards for testing to ensure safe, reliable and efficient machine design and mechanical production. This was first applied to steam boilers in 1915 and has since expanded to 48 performance test codes that apply to a host of engineering equipment and systems. These standards provide a "level playing field" for both manufacturers and the end-users of the equipment evaluated. Code acceptance ensures the highest level of accuracy, precision and reliability based on the most up-to-date engineering knowledge.



**Figure 1.** Simplified representation of time delay measurement by acoustic scintillation.



**Figure 2.** ASFM Advantage.

The ASFM is a non-intrusive method that uses [ultrasonic pulses](#) across an intake to analyze variations in turbulence to measure flow at hydroelectric plants (Figure 1). These data are used to produce real-time current velocities and discharge volumes. Installations are useful for turbine efficiency and optimization. The ASFM has had successful installations at hydroelectric plants all around the world including Canada, USA, France, Czech Republic, Spain, Korea and Sweden.

The ASFM offers two typical configurations: the [ASFM Advantage](#) and the [ASFM Monitor](#). The Advantage is illustrated in Figure 2. Listed below are some of the features of this unit.

- No intake/unit dewatering required if frame installed.
- Cost-effective support of unit, plant and system level optimization models.
- Non-intrusive, no head loss and no vulnerability to debris impact.
- No moving parts, no mechanical maintenance and no calibration.
- Can be set up for single or multi-bay installation, with up to 30 paths distributed among the bays. The same equipment and frames can be used at all intakes at a multi-unit plant.
- Can be adapted for fixed or profiling frame operations.
- Discharge results available immediately after completion of measurements.
- Offers simple, user-friendly displays and outputs.
- Can be operated remotely or locally.