

(Supplement – 6) Introduction of New Technologies

Coanda Screen :

(Source) <http://www.waterscreen.com/coanda-effect.html>

Coanda screens are tilted profile wire bar screens. The shape of the screens allows the screens to remain clean with little or no mechanical cleaning. The operation is enhanced by the Coanda Effect as the screens catch only the bottom layer of water. The tilted profile wires of the Coanda Screen slice off thin layers of water, allowing debris and fish to pass safely over the screen as water falls through the screen.

Inflatable weir :

(Source) Guide on How to Develop a Small Hydropower Plant (Page 105-106)

https://www.calvin.edu/~pribeiro/courses/Power%20Systems%20Interim/Part_1_Guide_on_how_to_develop_a_small_hydropower_plant-Final.pdf

The inflatable weirs are flexible gates in the form of a reinforced, sheet-rubber bladder inflated by air or water, anchored to a concrete foundation (Figure 5.11) by anchor bolts embedded into the foundation. Like any other gate, the inflatable weir needs a mechanism by which it is opened and closed. The weir is raised when filled with water or air under pressure. An air compressor or a water pump is connected, via a pipe, to the rubber bladder. When the bladder is filled the gate is raised; when it is deflated the weir lies flat on its foundation, in a fully opened position. The system becomes economic when the width of the weir is large in relation to the height.

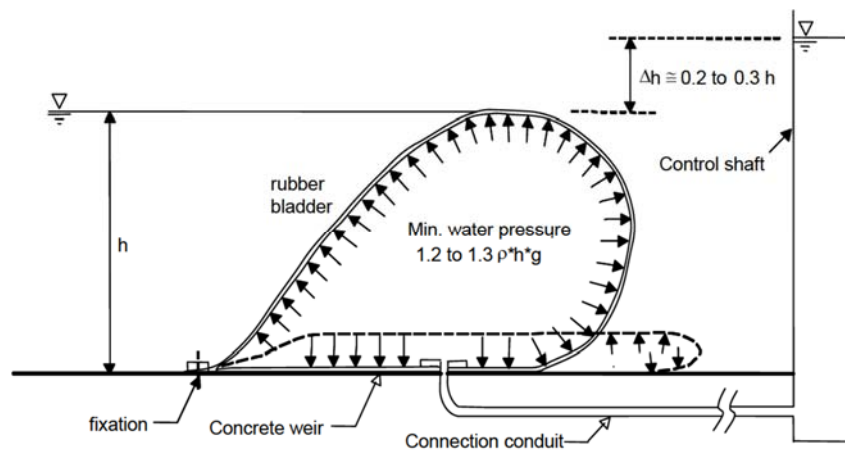


Fig. 5-11 Inflatable Weir

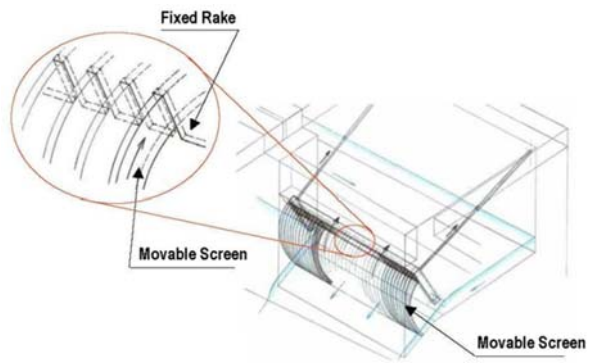
Floating Debris Management :

The trashrake of reverse-washing method with low-cost and unnecessary dust removal that suited for the feature of small-scale hydropower plant.

After stopping the turbine generator, the trash adhering on the screen is removed with a fixed rake by rotating the movable screen, then the removed trash is back-flowed from turbine conduit to bypass channel.

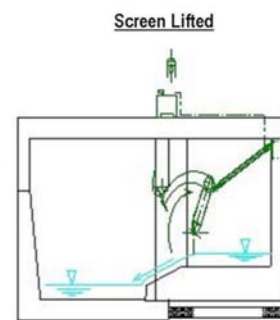
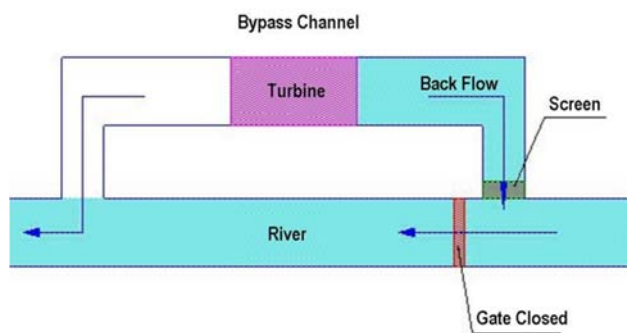


Overview of Water Turbine

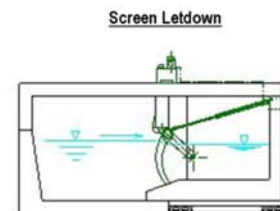
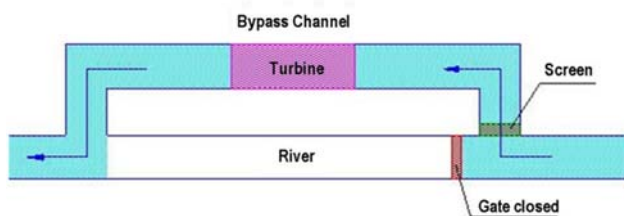


Outline of Intake Screen

At flushing the screen



At Generating



Procedure of accumulated trash removing in the screen

High Density Polyethylene Pipe / Weholite

(Source) <https://www.weholite.com/>

The Weholite Polyethylene (PE) or Polypropylene (PP) pipe is a spirally wound structured-wall pipe, which makes it very light weight. The product is designed for non- or low pressure applications such as sewage, drainage, storm water, road culverts and retention tank systems in diameters currently available up to DN/ID 3500 mm.

(Reference) Weholite facilities Canadian hydropower project

High Density Polyethylene Pipe

The use of large diameter high density polyethylene (HDPE) pipes as a penstock to transport water from a source to the power plant is relatively new and is helping increase efficiency standards in construction and operation.

Alternate Products for the Penstock (FRPM/FRP pipe)

(Source) <https://www.ieahydro.org/annex-ii-small-scale-hydropower/innovative-technologies>

(312-1 Alternative Products for Penstock)

Because hydropower pipes manufactured using fiberglass reinforced plastic (mortar) have a number of benefits in terms of economy at small and medium-scale hydropower sites and construction safety, it is planned to promote their use at small and medium-scale hydropower plants through use in power-generating pressure pipes.

Small scale Kaplan Turbine Generator :

(Source) <https://www.ieahydro.org/annex-ii-small-scale-hydropower/innovative-technologies>

(311-3 Micro Kaplan Turbine)

A unitary 30kW power generation system comprising a water turbine, generator and control system packaged in a single unit for installation in existing agricultural water channels with low head, and designed to minimize associated construction costs..

Micro Tubular Water Turbine :

(Source) <https://www.ieahydro.org/annex-ii-small-scale-hydropower/innovative-technologies>

(311-2 Micro Tubular Water Turbine)

A 3-250kW micro hydropower system making effective use of currently unused energy in existing regulator valves and falls in water channels. A generator unit aimed for reduced costs of public works, increased annual power output, and ease of maintenance..

New model turbine generator applied advanced technology of wind turbine (Gearless turbine generator)

A designing method of a gearless generator, connected directly with wind turbine, is applied on hydropower generator. In response to the change of water level at the head tank, the variable speed turbine generator can generate power more efficiently than the fixed speed type turbine generator, and also can be installed in a narrow space.

(Reference)

- WINDBLATT/ENERCON Magazine 03/2009
Page 10, ENERCON Technology proves its worth in hydropower
- WINDBLATT/ENERCON Magazine 01/11, Page 5, Weser hydropower plant
- Zek HYDRO 2013, Page 72, Green City Energy enables participation in small French hydroelectric power stations (Page 72-75) (https://issuu.com/zekmagazin/docs/internationale_2013)