KINETIC HYDRO

Newsletter 2: Winter 2021-22

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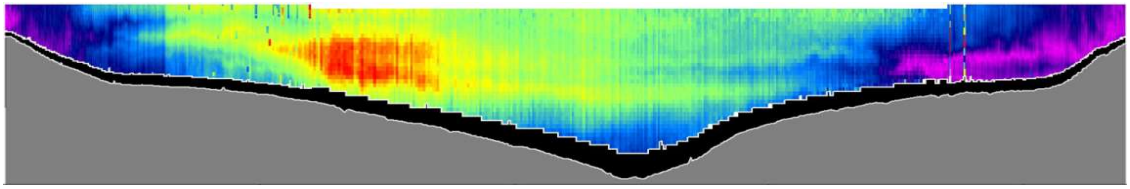
This is the second in what we intend to be a regular set of newsletters published roughly every quarter. It gives a flavour of what we have been up to at Kinetic Hydro. We hope that you find these communications interesting, but if you don't want to receive our newsletters please let us know by sending an email to info@kinetic-hydro.com.

How fast is the water flowing?

Understanding how fast the water is flowing is of fundamental importance to the performance of hydrokinetic turbines*. But measuring flow velocity is not as straightforward as you might imagine. Technologies to do so range from throwing sticks in the water to sophisticated Acoustic Doppler Current Profilers (ADCPs) costing upwards of £30k!

To characterise the hydrodynamics of our turbine we have built a digital flowmeter based on yacht technology for a few hundred pounds. On its own this wouldn't be very accurate, but working with staff and students from the University of Edinburgh we have calibrated our budget device against their top of the range surface ADCP. We have also trialled a riverbed 'Eco ADCP' providing a second calibration point; our thanks to Nortek UK Ltd for providing this. These tests have shown that results from our low cost flowmeter are repeatable and we are all set to use it in a more accurate test of our turbine.

* For those of you who are into the science the power produced by a turbine is proportional to the velocity cubed; so a doubling of velocity results, in theory at least, with an eight-fold increase in power.



Sophisticated ADCPs can generate a profile of flow velocities throughout a river channel. Image source sontek.com.

Testing with the UoE ADCP (front), and Kinetic Hydro flowmeter (behind) at Pinkston Watersports.

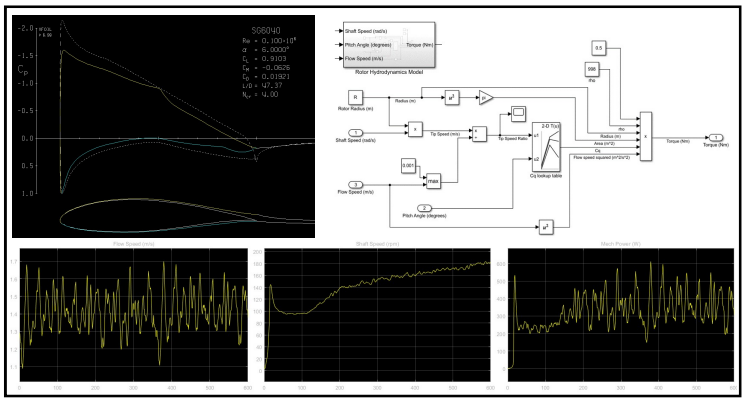
Pinkston Watersports

The artificial white water course at Pinkston Watersports is a legacy of the Glasgow 2014 Commonwealth Games. It provides close to ideal conditions for performance testing and development of our turbine. The flow rates of around 1.5 meters per second are repeatable and, unlike a real river, can be turned on and off at the flick of a switch. We have characterized the flow profile and are going to be spending a lot more time there over the coming months putting our turbine through its paces.

Left: Kayaking on the whitewater course at Pinkston. Image source pinkston.co.uk.

Turbine simulation

One of the first activities to be kicked off as part of our grant-funded project was to build a numerical simulation of our turbine using *MathWorks Simulink*. This model includes a representation of all the hydrodynamic, mechanical, electrical and control subsystems which must work in harmony in our finished products. Having this capability allows us to quickly and cheaply run virtual turbine trials, which we use to iterate and improve our designs before going to the expense of building them. However, we can't completely remove the need for physical testing. The measurements we'll make during our turbine trials at Pinkston will be used to validate and update our numerical models… more about which in our next update!



Above: Early simulations of the Mk-I turbine in operation at Pinkston

Closing our first funding round

In December we closed our first funding round. Together with a £100k grant from Scottish Enterprise this injection of capital means that we have sufficient funds to pursue our technology and business development goals throughout 2022. We are extremely grateful to our five new shareholders, and will be doing our utmost to provide a return on their investment.