

# How Scotland's Falkirk Wheel Lifts 60-Foot, Hundred-Ton Boats on a Regular Basis

By: [Marshall Smith](#) | October 13th, 2015

Scotland's Falkirk Wheel is an engineer's dream, and [YouTuber Tom Scott](#) has an awesome video explaining the basic physics behind the rotating boat lift.

The Falkirk Wheel is a rotating boat lift that regularly lifts entire 60-foot, hundred-ton canal boats, one of which runs 80 feet higher than the other, to enable vessels to travel between two canals.

## How the Falkirk Wheel Works:

The wheel uses caissons that counterbalance each other precisely. The two caissons, which are water-filled pods that the boats sit in on either end of an arm, centered around a main wheel, are filled with 500 tons of water each.

As a canal boat enters the Falkirk Wheel, it displaces the same amount of water as it weighs, always ensuring both arms are perfectly balanced.

As a result, the amount of energy it takes to lift a boat is minimized as much as possible.



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Source <http://www.industrytap.com/scotlands-falkirk-wheel-lifts-60-foot-hundred-ton-boats-regular-basis/32028>

# The Falkirk Wheel, Uniquely Scottish

By: [Jeremy Helms](#) | February 13th, 2013

Scotland is a land that has been linked to a mystical past. Druids, Nessie and men in skirts – you never know what they'll do next. Scotland also gave us Sean Connery, the best James Bond according to my unabashed mother.

A bit more functional than spies or legends, Scotland has also constructed a unique massive spinning wheel that grabs boats from one river and plops them down safely into another, 25 meters below. This is not fantasy. This is *Scotland*.

Based on Archimedes' principle, floating objects displace their own weight in water, so the caissons always weigh the same! Always remember the classics. By this method, the wheel is always balanced, allowing the most mind-blowing statistic about this wonder to exist—the Falkirk Wheel uses only 30.2 horsepower to rotate! In just over five minutes the wheel makes a half rotation, moving 600 tons to its new canal, using a measly 1.5 kW/h. The same amount of power used to boil eight kettles.



*The Falkirk Wheel*



*Upper Level of the Falkirk Wheel*

The rotating boat lift is used to connect the Forth and Clyde Canals near the town of Falkirk. It opened in 2002, carrying boats from one canal to the other over a vertical difference of 24 meters.

The unique and innovative Falkirk Wheel—the only one of its kind in the world—is regarded as a landmark in engineering attributed to the Scottish.



**Jeremy Helms**

Jeremy Helms is an engineering enthusiast.

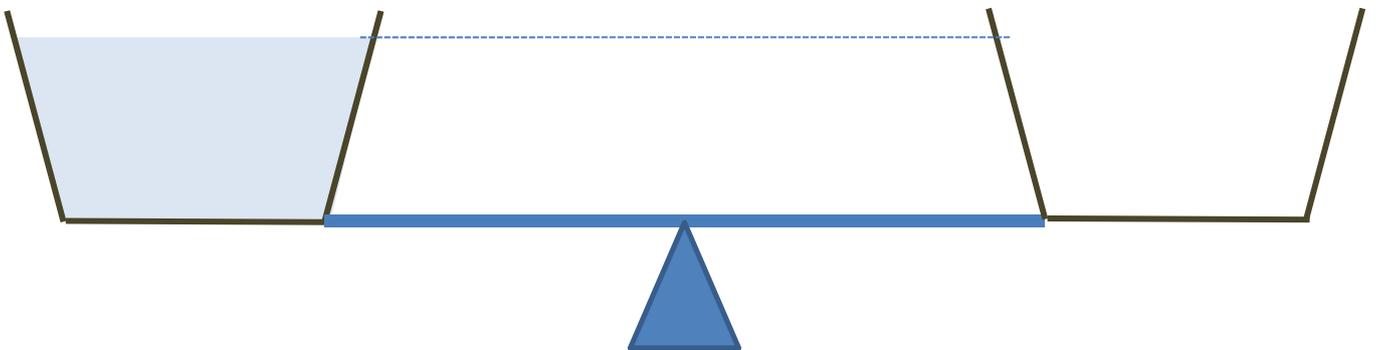


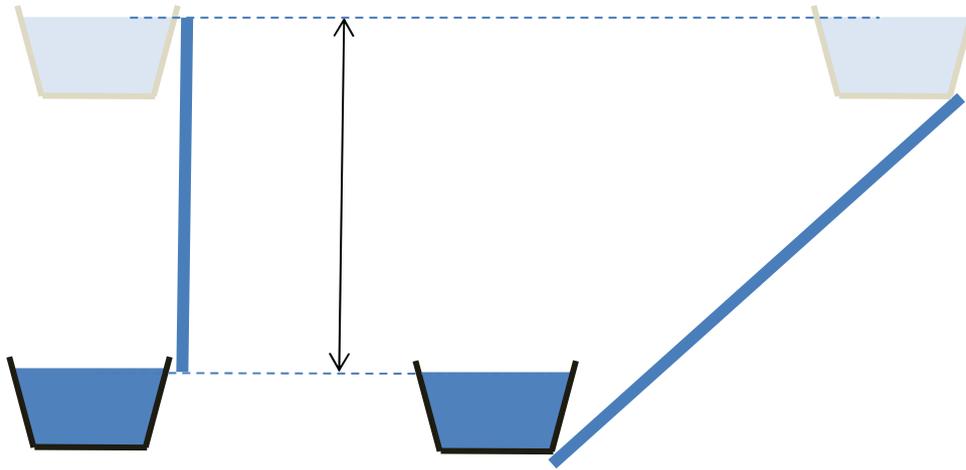
*Lower Level of the Falkirk Wheel*

1°) Find on the net an expression of Archimede's principle and illustrate it with a sketch.

2°) Explain in which way it is very cleverly useful for the Falkirk wheel

*Illustrate first your explanation by completing and labelling the sketch below.*





1°) Explain the calculation of the necessary work to lift the load mentioned in the second article.  
You may use [https://www.engineeringtoolbox.com/potential-energy-d\\_1218.html](https://www.engineeringtoolbox.com/potential-energy-d_1218.html) to help

2°) What is the examples given to illustrate the estimation of this work

3°) state the idea used to minimize so considerably the energy required