WATER Kidz

Discover the wonder of the WATER WHEEL

Lani van Vuuren

Ever wonder where this magazine gets its name? *The Water Wheel* magazine is named for one of the most powerful and enduring innovations since the history of man. The humble water wheel has been credited for being the inspiration behind cogs and gears – the basic building stone of almost all modern machinery.

Everybody knows that water is life – without water we will have nothing to drink, we cannot grow food or keep healthy and clean. But history has shown us that we can also use water for other purposes – water can also be used to create power and drive industry. Before there were mighty coal-fired and hydroelectric power stations, before even the power of steam was discovered, people understood the power of water. They learned to harness this power through the water wheel.

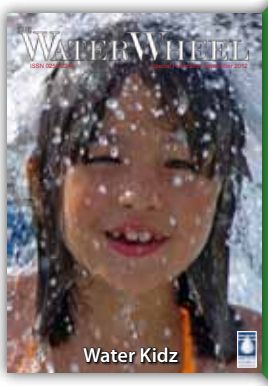
A water wheel can basically be described as a device that uses flowing or falling water to create power by means of a set of paddles or buckets nmounted around a wheel. The force of the water moves the paddles, and the consequent rotation of the wheel is transmitted to machinery via the shaft of the wheel. In this way the energy of the falling water is converted into useful forms of power.

Water wheels can either be horizontal or vertical (although the latter is most common). Early water wheels were manufactured from wood and other natural materials, such as bamboo. Later water wheels were manufactured of metal. Modern hydroelectric dams can be seen as the descendants of the water wheel as they too take advantage of the movement of water downhill.

No-one knows exactly when or by whom the water wheel was originally invented. References to water wheels can be found in literature thousands of years old. All the ancient civilisations made use of water wheels – albeit of different designs, from the Chinese, the Greeks (and later the Romans), to ancient Middle Eastern civilisations. Water wheels were probably the first method of creating mechanical energy that replaced humans and animals.

It was during the early Industrial Revolution that water wheels really came into their own. From monasteries to commercial factories, water wheels were used for everything from grinding flour, to hammering wrought iron, machining, ore crushing, crushing sugarcane, and pounding fibre for use in the manufacture of cloth. Water wheels also led to the first large-scale dam construction in Europe, as mill ponds (or dams) and canals were constructed to feed the wheels.

Even after the invention of steam power water wheels remained in use, although they are no longer common, and many are only for aesthetic purposes.



Kidz, get your own magazine for free

The Water Wheel's special Water Kidz Edition is now available free of charge. The magazine contains 48 pages of the best Water Kidz articles published over the years – ideal for school projects and the classroom. To order your hard copy, Email: laniv@wrc.org.za; or Fax: (012) 331-2565. Postage will be charged for multiple copies weighing more than 3 kg. Individual articles can be downloaded from the WRC website, Visit: www.wrc.org and click on the Learning tab.

Make your own Water Wheel

You will need:

- An empty two-litre fizzy drink bottle
- A cork
- Two cocktail sticks
- A pair of scissors
- A jug of water
- A craft knife and a small screwdriver

Instructions

1. Cut the bottle in half and ensure the edges are smooth
2. Take the lower half of the bottle and make two small v-shaped cuts on opposite sides of the rim. This is necessary to support the wheel on top of the base
3. Take the top of the bottle and cut a strip of plastic about the same width as the length of the cork. From this strip cut individual paddles about 3 cm in width.
4. Mark the end of the cork with a pen, dividing it into six sections. Cut an incision down the length of the cork from each of these marks. These incisions should be a few millimetres in depth.
5. Make two holes in the centre at either end of the cork. This can be done with a small screwdriver or nail.
6. Slide each of the six paddles into the slits into the cork. Ensure that all the paddles are curving the same way. It is best to start at one end of the cork and gently push the paddles through.
7. Carefully inserts a cocktail stick in either end of the cork and place the completed wheel on the base.
8. Gently pour water over the paddles and make any final adjustments.

(Explanation – the weight of the water creates a pressure that pushes the paddles of the water wheel. If you pour water onto the wheel from a greater height the wheel spins faster than if the water falls from just above the blades. This is because water releases more stored energy as it falls).

Source: www.wessexwater.co.uk

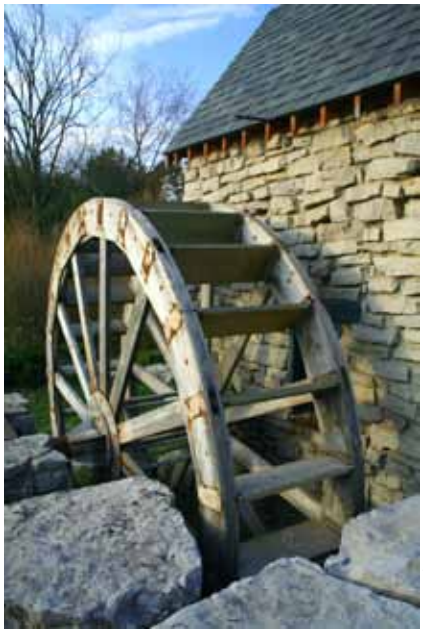
WATER WHEELS IN SOUTH AFRICA

While South Africa is not endowed with the one ingredient that make water wheels work really well – large volumes of fast-running water – the country has had its own share of water wheels. The water wheels located in the Northern Cape towns of Kakamas and Keimoes are as much part of the culture of the farming communities as the grapes and raisins the region is famous for.

Unlike Europe, water wheels in South Africa were not used so much in industry. The most popular application of this technology was to lift irrigation water from lower to higher irrigation fields. The design of the South African water wheel is based on that of the noria, a water wheel which probably originated in Persia and that is basically a wheel fitted with buckets on the peripherals for lifting water (for this reason, the old folk also used to refer to water wheels as 'bakkiespompe').

Muslim engineers used norias to discharge water into aqueducts which carried the water to towns and fields. Some of the norias used in the medieval Islamic world were as large as 20 m in diameter. Today, there are surviving norias at Hama, in Syria.

A source of inspiration and innovation, the water wheel forever changed the industrial landscape of the world, allowing people to move ahead technologically. For that we salute this humble contraption and hope that it will inspire others to kick their lives up a gear. ❑



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Dating back to ancient times, water wheels are said to have been the inspiration for modern machine gears.

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For many years the faithful water wheels at Kakamas have been used to move water from one irrigation canal to another.

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One of the most famous water wheels in South Africa is situated at Keimoes in the Northern Cape. The design is based on the Noria water wheel created in the Middle East during ancient times.

Did you know?

In around 1086, the then King of England, William of Normandy, ordered an inventory of all the potentially taxable property, including around 6 000 mills spread across 3 000 different locations.