



Overshot Waterwheel

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Researched by: Richard Curtis (Trustee)

Artefact that dominates the Museum's grounds



The overshot waterwheel dominates the Museum's grounds and is the first thing visitors see as they arrive down the drive to the Waterworks Museum. If the water is flowing and the wheel is turning visitors know that the Museum is open.

Built by the Eagle Foundry in Aberystwyth in 1907, it was used on a farm on the Dolaucothi Estate in Carmarthenshire to drive workshop machinery. There it remained, including for a long time in a derelict state, until the 1970's when it was donated to and restored by the Welsh Industrial and Maritime Museum (WIMM). Here it was displayed in Cardiff Bay between 1977 and 1998 when this museum was closed.

The following year the waterwheel was installed at the Waterworks Museum after it was offered to Trustees on long term loan from the National Museum of Wales (the successor museum to the WIMM collection).



The waterwheel is often used as an impressive backdrop for visitor's photographs.



The Eagle Foundry, Northgate Street, Aberystwyth



The proprietor of the Eagle Foundry was Richard Jenkin Jones, an entrepreneur who also had an interest in the town's gas company and a coal merchant, in which he was in partnership with his brother. He had acquired the foundry

from Ellis Brothers (bankrupts) in 1882, and he had operated it in partnership with James Dougall until that was ended by mutual consent in 1902 when it was trading at a loss.

Newspaper clippings show that between 1907-1909 the Eagle Foundry won several prestigious tenders, including for an iron bridge over the River Rheidol and repairs to Aberystwyth's cliff railway.

Competition was, however, high with two other iron

foundries based in Aberystwyth and in 1910 RJ Jones ceased trading at Eagle Foundry. Two years later, in August 1912 he was subject to bankruptcy proceedings (which included iron foundry debts).

For the next 50 years the site of the foundry, which had been held under a lease from Aberystwyth Town Council, was used for various purposes until it was demolished in the 1970's to make way for government buildings.

The Dolaucothi Estate, Pumsaint, Carmarthenshire



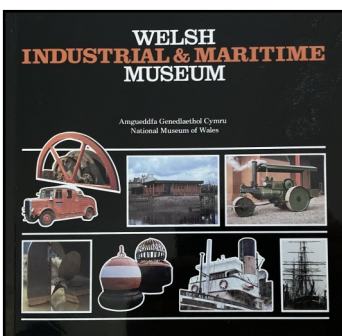
National Trust archives record these images of the waterwheel as taken on 27 December 1973, with the photo above showing a 'break in supply to the riser of the waterwheel'.

Unfortunately, there are no records to identify which farm this waterwheel was installed at. The Dolaucothi Estate comprised 3,172 acres of land and maps show several farms close to water supply. Maps also show the site of an estate sawmill but this is less likely given the only description we have of its use was 'to drive a saw-bench and grindstone'.

In 1907 the Estate was owned by Lieutenant General Sir James Hills-Johnes VC GCB, a military hero of the Indian Mutiny of 1857 and a former military governor of Kabul in Afghanistan.

The Estate passed into the ownership of the National Trust in 1956, it having previously been transferred to it in 1941 subject to the life interest of the then owner.

Saved by the Welsh Industrial and Maritime Museum



The National Trust donated the overshot waterwheel to the Welsh Industrial and Maritime Museum in December 1976. Alongside the Simpson Beam Engine which is also on display at the Waterworks Museum, the waterwheel was one of the first artefacts acquired by the new museum, which opened its doors in 1977.

It lived here sitting by the main entrance until 1998 when this museum closed to prepare for the creation of the Cardiff Bay Barrage.

Many items were put into storage until the opening of the National Waterfront Museum in Swansea in 2005. However some items were distributed to other museums



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How the waterwheel came to Hereford

Shortly before the closure of the Welsh Industrial and Maritime Museum in 1998, agreement was reached to bring the overshot waterwheel to Hereford.

The waterwheel had to be removed quickly, however, as contractors were waiting to demolish the museum in Cardiff.

It was initially stored at Welsh Water's Broomy Hill site where it remained for over a year as volunteers focused on installing the 1851 Beam Engine which was also acquired on loan at the same time.

The waterwheel was in good condition so volunteer efforts were focused on where to site it to best effect.

This required a major project, described on page 4, which was completed by March 2000 when the waterwheel turned for the first time at the Waterworks Museum.

Formal inauguration of the waterwheel took place when Anna Southall (Director of the National Museum of Wales) turned it on at our Gala Day in 2000.

This Millennium event was also attended by local councillors Sue Andrews and Les Andrews.



<u>Sequence of events</u>	
Mar 1998:	agreement reached to loan the waterwheel
May 1998:	museum in Cardiff closed
Jun 1998:	waterwheel moved to storage in Hereford
Jul 1999:	planning consent obtained
Nov 1999:	work started on waterwheel foundation and supporting structure
Mar 2000:	waterwheel turned for the first time
Jun 2000:	waterwheel formally inaugurated

The last twenty years

Since March 2000 the overshot waterwheel has, except when undergoing routine maintenance, turned every time that the Waterworks Museum has been open to visitors.

Maintenance needs are infrequent but require significant effort on the part of Museum volunteers to restore as necessary and repaint the giant wheel and its 48 steel buckets.

To date, this has been necessary three times and can take our volunteers up to 6 months to complete. The images opposite show the most recent maintenance project which was completed over the winter/spring period in 2016/17.

This impressive artefact is over 100 years old, is still turning and drawing visitors to the Museum and long may it continue



Since ancient times a waterwheel has been used to convert the energy of flowing water into a useful form of power, for example to drive a watermill or in the case of the Dolaucothi waterwheel to drive workshop machinery.

There are three types of waterwheel. In an over-shot waterwheel the water flows from above the wheel itself, falling into the buckets pushing the wheel forward. This motion is transmitted to power machinery via the turning shaft of the wheel.

The main difference between the three types is where the water hits the paddles. Water flows to an under-shot waterwheel from below and a breast-shot waterwheel in the middle.

More frequent maintenance is needed, however, to remove the layers of algae and airborne detritus which build up on the waterwheel



Focus on . . . installing the waterwheel

An account of the design work and preparations for its mounting, water feed and display

Written by Ray Morgan, who was Vice-Chairman of the Museum in 2000

Because the waterwheel was received in such excellent condition much thought was given initially to its location so as to present it to best advantage, keeping in mind possible future site requirements. It was important that it should not detract from or obscure existing exhibits or facades of buildings. The chosen location was on the hillside to the east of the Tangye House, which affords a good elevation when viewed from the approach road to the Museum.



Foundations of adequate strength and of sufficient depth were needed to give stability as the ground in this area is of the nature of clay. A recirculation system was required to provide the water supply over the 'wheel and designed to return the water to a collection sump. The arrangement had to be able to cope with rain water and winter snowfall.

Water system

The water recirculating pump is located in the Tangye House. Its level, in relation to the sump below the 'wheel, is of prime importance in order to ensure that the pump remains primed and ready for use at all times. Therefore the level of water in the sump is maintained at a higher level than the pump outlet pipe to the launder. This factor determined the general level of the whole exhibit and associated surrounding works.



Ease of operation

The sump is equipped with a filtration system to protect the pump from the ingress of foreign matter and also has an overflow arrangement to maintain the appropriate water level.

A ready means of emptying and refilling the system has been incorporated so that cleaning the filters and controlling the mains water supply can be easily achieved.

Reference details of the 'wheel

Diameter	14' 00" (4.27m)
Width	3' 02" (0.96m)
No. of buckets	48
Weight (approx)	2.5 tons (2540kg)

Waterwheel installation

The reinforced concrete supporting piers are surmounted by A-frames of welded steel construction. These carry the wheel bearings on the cross-members and the launder channel over the summit of the 'wheel. With the A-frames in position the 'wheel was brought down from its winter hibernation at the Dwr Cymru-Welsh Water site on Broomy Hill. It was lifted over the trees at the Museum and on to its bearings by long-jib crane.



Launder

Note: A launder is an inclined channel or trough for the conveyance of a liquid such as water

It is of interest to note that the cast iron column supporting the outer end of the launder channel was originally part of the suction pipe feeding the electric submersible pump mounted in Bay 5 of the Museum main building.

The recirculating water supply for the 'wheel is taken in modern pipework up to the launder within the cast iron column and hence completely out of sight. Thus the source of water remains a mystery for visitors.

Landscaping

After a major civil engineering project such as this the ground becomes churned up for some distance around the site. With the 'wheel safely in position and tested the opportunity has been taken to landscape the area.



Open spaces have been grass-seeded and Museum volunteers have kindly provided shrubs which have been planted appropriately. With new pathways and paved areas the site is looking quite civilised. The water wheel is well appreciated by visitors and its successful installation is a source of great satisfaction to the volunteer members.



Acknowledgements

The Trustees are grateful to the National Museums and Galleries of Wales for the privilege of displaying this fine example of water engineering.

The design of the project together with most of the mechanical and electrical installation work was undertaken by the Museum volunteer engineers.

Main contractor for the civil engineering and positioning of the waterwheel was MHP Powell (Construction) of Clifford, near Hay on Wye..