THE QUALITY MAGAZINE FOR STEAM & INDUSTRIAL HERITAGE ENTHUSIASTS

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# Vintage SPIRIT

## BULLIED BOILER ON THE ROAD

A HEAVY HAULAGE RUN IN EAST SUSSEX

## BRUNEL'S GORGEOUS BRIDGE

BRUNEL'S CLIFTON SUSPENSION BRIDGE

## PADDLING TO ILFRACOMBE

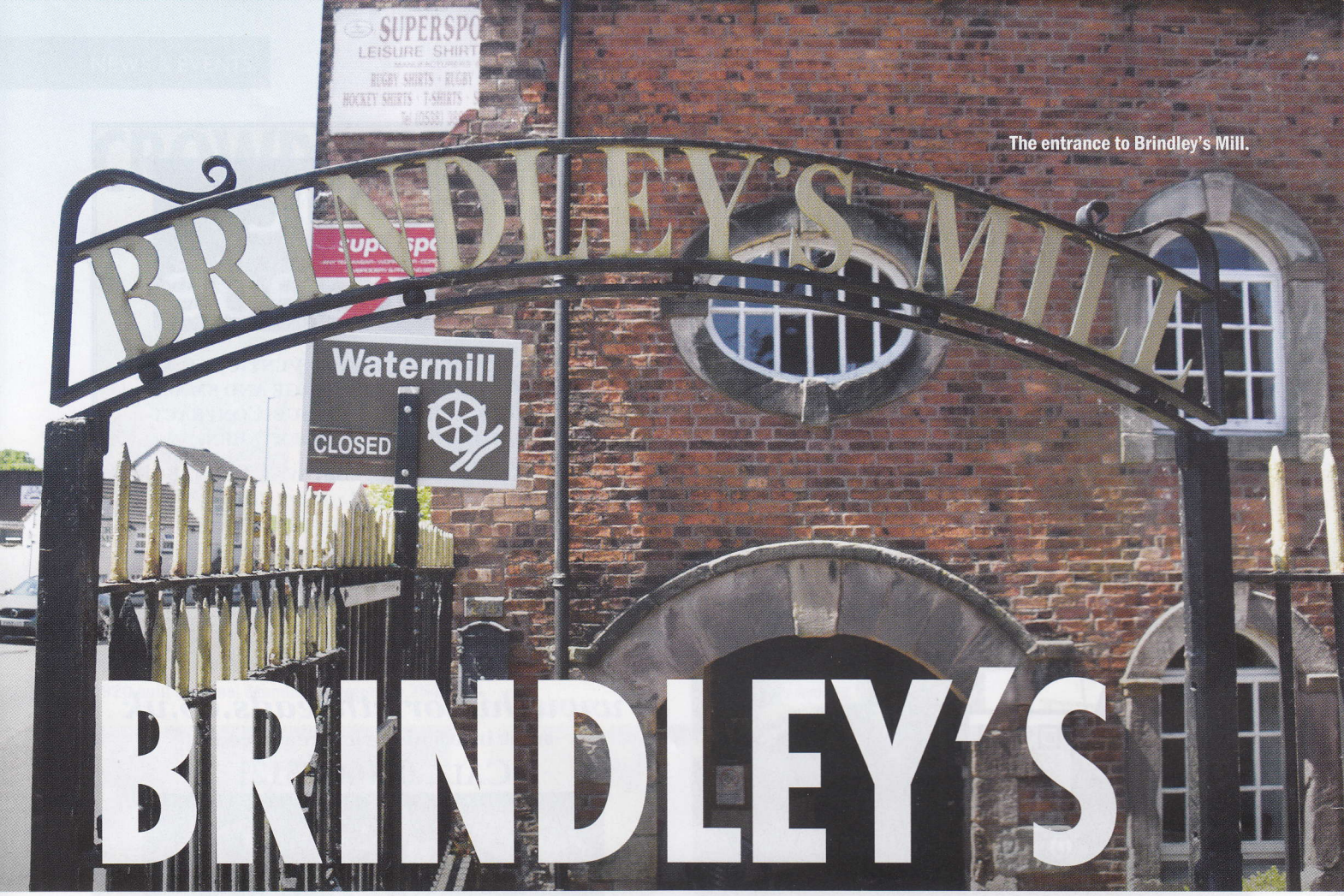
STEAM-POWERED CRUISE ALONG THE DEVON COAST

ISSN 1477-1276

**D-DAY 80: IN FRANCE**
COMMEMORATING THE D-DAY LANDINGS

**A DAY AT FAWLEY HILL**
THE FAWLEY HILL FESTIVAL OF TRANSPORT

**BRINDLEY'S MASTERPIECE**
BRINDLEY'S MILL AT LEEK IN STAFFORDSHIRE




The entrance to Brindley's Mill.

# BRINDLEY'S MASTERPIECE

The Water Mill at Leek in Staffordshire is thought to be the only corn mill built by James Brindley. **Bob Weir** investigates.

Brindley was one of the engineering heavyweights of the 18th century and his work is usually associated with canals. He was responsible for a lot of Britain's canal network especially in the Midlands, but also completed many other projects.

Brindley's Mill is not just a historical monument, but a testament to the engineering prowess of the 18th century. It was built in 1752 and restored to working order in the 1970s. It is a Scheduled Monument and Grade II Listed building. The property was converted into a museum in the 1970s and is now run by the Brindley Mill Preservation Trust.

**Mills are very dependent on water. Levels were low at the time of my visit.**

Water mills were popular in the Middle Ages and Ranulf de Gernon, 4th Earl of Chester, owned a water mill in Leek as early as the 12th century. Many of the buildings were run by religious orders and by the time of the Dissolution of the Monasteries (1536-41), the town could boast two mills.

Brindley was asked to rebuild the corn mill on or near the former site, not long after he set up his business in 1742. This involved constructing a mill race and weir, and one of the surviving stones indicates the date 1752.

The Earl of Macclesfield looked after the mill in the 19th century, but ownership was later passed to local textile mill owners. It stayed in use as a mill until 1940, and the tenant millers used the premises for flour milling, sawmilling. and the production of animal feeds. In 1948 a third of the property was demolished as part of a road widening scheme. A brick gable wall was built on the south side, where there had once been a partition wall.

The building started to deteriorate over the years, until it came to the attention of Dr Cyril Boucher. Dr Boucher was an

The view of the mill from the bridge over the weir.


The all-important waterwheel. When in gear and with a normal head of water, it turns at around five revolutions per minute.

expert on early engineers and had started studying the mill in detail in the 1960s. He described it in his biography of James Brindley in 1968, the year it was listed as a Scheduled Monument.

One thing led to another, and the Brindley Mill Preservation Trust was registered as a charity in 1970. Its aim was to buy and restore the mill and the freehold was acquired in 1972. Work went ahead and the mill was officially opened to the public on 4th May 1974. The James Brindley Museum followed six years later.

During the restoration, it was noticed that the mill exhibited more than 200 years of milling practice. The water flow had reduced over time, and an early form of turbine remains in the by-pass waterway. Electricity was installed in 1921 and several motors were used for saws and hoists.

## A BRIEF HISTORY OF LEEK

**Leek** formed part of the great estates of Ælfgar, Earl of Mercia, before being taken over by William the Conqueror, who held it at the time of the Domesday Survey. The town is an ancient borough and was granted its royal charter in 1214. It was a local centre and held a regular cattle market for hundreds of years.

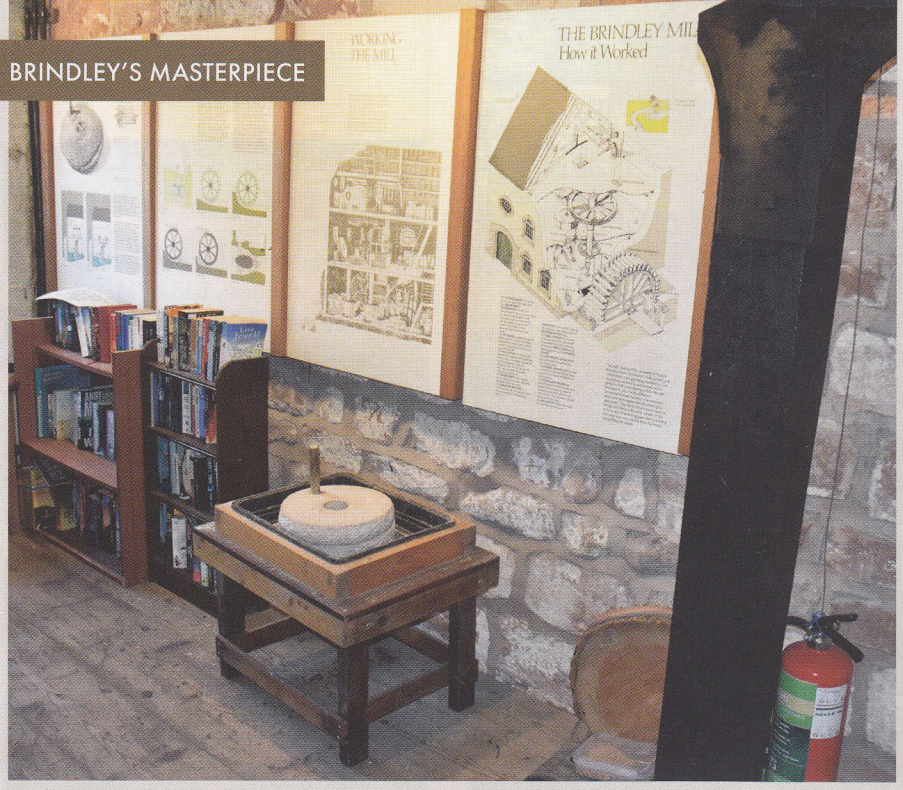
Following the Industrial Revolution, the town specialised in textiles, including silk. Silk manufacturing can be traced to the latter part of the 17th century and is thought to have been aided by the settlement in Leek of some Huguenots, after the revocation of the Edict of Nantes in France.

Although the work has disappeared, the mills are still there, and many have been converted into housing. Listed buildings include the original parish church, St Edward the Confessor's, and a Victorian church, All Saints, designed by Richard Norman Shaw. Many Victorian period buildings still stand in the town.

Leek is also associated with the Sugden family, a family of architects who designed some of the town's finest Victorian buildings. These include the Nicholson Institute, the Big Mill, and the local church with its 130ft spire. Built in 1857, the Big Mill was a silk mill on a grand scale, rising six storeys high, 21 bays long, and five bays deep. It set a pattern for other silk mills in the area.

Leek is well-known for its "double sunset", which occurs during the summer solstice. A double sunset is a rare astro-geographical phenomenon, in which the sun appears to set twice in the same evening from a specific viewing point.

The town is located at the foot of the Peak District National Park and is referred to as the gateway to the Peak District. It is also the administrative centre for the Staffordshire Moorlands District Council. It holds the Leek Arts Festival in May, celebrating the cultural heritage of the town. Notable residents include James Brindley and William Morris, founder of the arts and crafts movement.




The volunteers have made the best use of the available space.

The Brindley Mill Preservation Trust reception desk.

This is an early form of turbine. It is believed to have been installed several years after the mill was built.

Volunteer Neil Morley.

## A BRIEF BACKGROUND TO JAMES BRINDLEY

**James** Brindley (1716-1772) was one of the most prominent engineers of the 18th century and spent most of his life living in Leek. He has often been referred to as the 'Father of British Canals'.

Brindley was the oldest of seven children and came from a Quaker family. When he was ten, the family moved to Lowe Hill Farm in Leek. He received little formal education and was apprenticed to millwright Abraham Bennett near Macclesfield. Having completed his apprenticeship, he started his own business in Leek.

For the next few years, Brindley constructed many water mills. He soon established a reputation for being at home with machinery, and in 1752 designed and built an engine for draining a coal mine. It was during this period he was given the nickname 'The Schemer'. He followed this up by building a machine for a silk mill in Congleton.

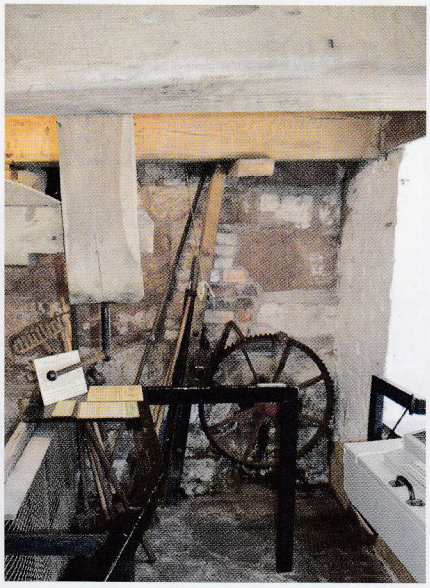
His career could have gone in several directions. Brindley advised on various things including windmills and even steam engines. However, it was his involvement in canals that would provide his lasting legacy.

His growing reputation brought him to the attention of the 3rd Duke of Bridgewater, who wanted to build a canal to transport his coal to Manchester. Brindley was commissioned as the consulting engineer, and the Bridgewater canal was opened in 1761. He overcame many difficulties in the construction of the canal, including building an aqueduct over the River Irwell. The canal was a commercial success and is regarded as one of the first British canals of the modern era.

Brindley pioneered the technique of contouring. This method avoided building embankments and tunnels. His greatest contribution was the technique of puddling clay to line the canals making them watertight. His reputation grew rapidly, and he went on to build 365 miles (587km) of canals. In addition, he built many watermills including the corn mill at Leek.

James Brindley was in today's language a self-employed consulting engineer and worked mostly for entrepreneurs involved in canal construction. His expertise was in such demand that he worked on several canals at the same time, travelling many miles surveying, advising, and supervising construction. The exhibits on display at Brindley's Mill include one of his surveyor's levels and notebooks where he recorded time and money spent on various projects.

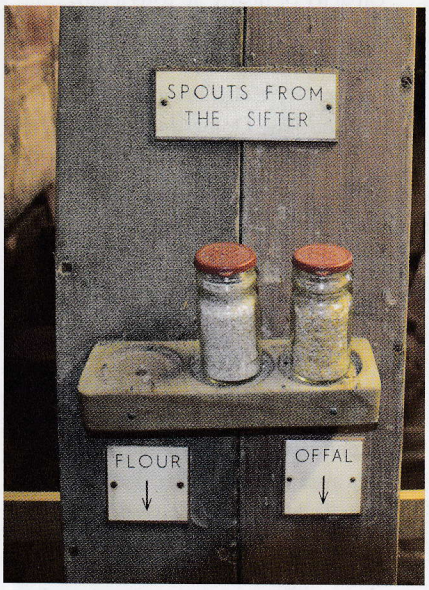
**The ground floor of the building was known as the Meal Floor. Power is transmitted from the pit wheel to the wallower and up to the first floor by the oak shaft. The shaft is supported by a brass footstep bearing bolted to the floor.**



**The geared wheel next to the window raises the sluice gate outside the mill. This allows the water to pass underneath to start the waterwheel, which is connected to the pit wheel by the axle tree.**

**Grain drying was an important part of the process.**

**The bearing at the bottom of this shaft is sitting on a pre-decimal old penny! This made it easier to take out and replace.**




**Spouts from the sifter.**

The mill is still in working order and produces flour from grain, although it is no longer a commercial enterprise. The building also houses a small museum. This features interpretive artefacts and panels illustrating the life of James Brindley and the history of milling.

A glance at the pit wheel and grinding stones is a glimpse through a window into the past. The building itself measures 28ft (8.5m) north to south and 27ft (8.2m) east to west.

The front, facing east, has a wide entrance on the left, with a segmental arch. There is also a circular window above. To the right, there are two arched windows on each floor.

The undershot waterwheel has a diameter of 16ft (4.9m) and width of 6ft (1.9m), on the north side of the building. Undershot is the term used to describe the oldest type of vertical wheel and uses a horizontal axle that is rotated by the water from a low weir striking the wheel in the bottom quarter.

The wheel works two sets of stones via an internal pit wheel, with original octagonal wooden vats and timber main shaft. Most of the energy is gained from the movement of the water and comparatively little from the head. They are similar in operation and design to stream wheels.

Near to the wheel are the weir, millpond, leats, and sluice gates to direct water away from the River Churnet. The river flow is controlled from the Tittesworth Reservoir and the minimum flow is 16 million litres a day. After turning the wheel, the water passes down the mill race in a 115ft (35m) tunnel below a neighbouring textile mill, rejoining the main flow at its lower level.

The floors inside the building housing the grinding stones and machinery, are supported by large oak beams. The roof rafters are supported by a king post structure resting on a curved tie beam. A king post is a central vertical post used in architectural or bridge designs.

The compact nature of the mill is a sign of the times, and during its working life would have been an important part of the local community. It continues to survive and prosper thanks to the sterling efforts of its volunteers and is popular with visitors. ■

## A BRIEF INTRODUCTION TO CORN MILLS

A corn, or grist, mill grinds cereal grain into flour and middlings. (Middlings are a source of protein, fibre, phosphorus, and other nutrients. They are useful fodder for livestock and are also being researched for possible use as a biofuel.)

Corn mills are believed to have been around in Roman times. Early examples had horizontal paddle wheels, and vertical wheels were in use by the end of the first century B.C. The peak of Roman technology is arguably the Barbegal aqueduct and mill in southern France, with a grinding capacity of nearly 30 tons a day.

Corn mills were used in the Middle East and by the 19th century were also common in Europe. The Domesday survey of 1086 gives a precise count of England's water-powered corn mills listing 5,624. This was one for every 300 people and was probably typical of southern and western Europe.

By the Middle Ages most towns and villages had their own mill. These communities were dependent on the mill, as bread was a staple part of the diet. Lots of mills were water powered, although some used wind power or livestock. In many water mills the wheel was mounted vertically and later designs used turbines.

Most modern mills run on electricity. This spins heavy rollers to separate the bran and germ from the endosperm. Different milling techniques produce varying results. Stone-ground flour is preferred by many bakers and natural food enthusiasts, because it is thought to be nutritionally superior and has a better baking quality than steel-roller-milled flour. By contrast, stone-milled flour has been found to be relatively high in thiamin, compared to roller-milled flour, especially when milled from hard wheat.

**Grain was poured into the hopper on the first, or Stone Floor, from the top floor. The hoppers at Brindley's Mill are quarter scale replacements to help with a demonstration.**

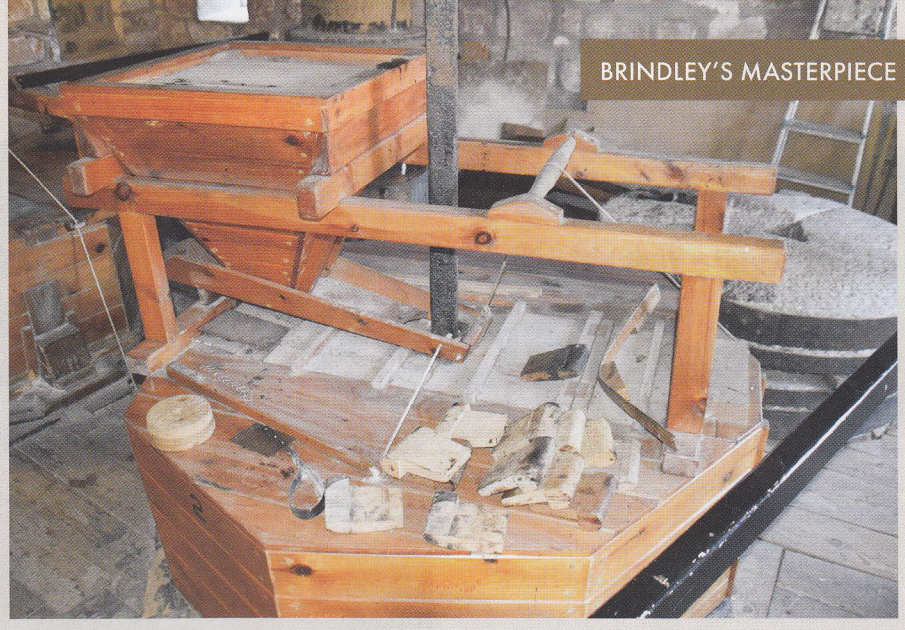
**Power is taken from the vertical main shaft by the great spur wheel...**

**... and is then passed through the stone nut to the top runner stone.**


Stone dressing tools. This was an important procedure and the millwright had to make sure the edges of the furrows were sharp to cut the grain. The lands between them also had to be flat, so that the stone dust did not get into the flour.

An oat crusher next to the miller's work bench.

Millers were an important part of the local community and usually survived economic downturns. This could lead to jealousy and accusations of profiteering.



ABOVE: The electrically-driven sifter is more modern, although early versions could take power from the main shaft.

LEFT: Good tools were an essential part of any mill.

## FURTHER INFORMATION

Brindley's Mill and the
James Brindley Museum,
214 Mill Street, Leek,
Staffordshire Moorlands, ST13 8FA.
Email: visit@brindleysmill.co.uk
Website: www.brindleysmill.co.uk

### THE BRINDLEY MILL PRESERVATION TRUST

Joining the Brindley Mill Preservation Trust (registered Charity No.501127) supports work promoting knowledge of James Brindley, and the part he played in Britain's industrial development. You don't have to be actively involved to become a member. Membership is by annual subscription and there are three categories:

| | |
|---|---|
| Student/retired member: | £5.00 |
| Individual Adult: | £8.00 |
| Family: | £12.00 |

Members get unlimited free admission to the mill and two newsletters each year.

Brindley's Mill is a registered charity and relies upon admission charges, donations and occasional grants to enable its maintenance and development. There are no paid staff, and the stewards are all volunteers.

## VISITOR INFORMATION

### OPENING DAYS & TIMES

The mill is open until the end of September as follows:

- Sundays and Wednesdays in June, July, and August.
- Sat 7th & Sun 8th September.

Opening times are 2pm to 5pm, last admission 4.30pm.

### ADMISSION

| | |
|---|---|
| Members: | Free |
| All Adults: | £5.00 |
| Children under 5: | Free |
| Children aged 5-18: | £1.00 |
| Private parties: | £5.00 |

### GETTING THERE

**BY CAR:** Brindley's Mill is on the A523 Leek to Macclesfield road about half a mile from Leek town centre. Parking is possible in Abbey Green Road (sat nav ST13 8FA) or the nearby Sainsbury's store on Churnet Way off the Macclesfield Road.

**BY BUS:** Staffordshire County Council has a bus timetable at: https://apps2.staffordshire.gov.uk/SCC/BusTimes/display

**BY RAIL:** the nearest railway station to Leek is Stoke-on-Trent (12 miles).