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Thoroughly modern milling

Tried and tested methods of milling might be good and appeal to the traditionalists. But change is important if you need to keep up with modern technology and demands, as Bacheldre Watermill in Wales recently discovered. **Andre Erasmus** reports.

Green valleys are what Wales is all about, say tourist associations the world over. And nesting on the bank of a spring-fed pond in a green, wooded valley is the Bacheldre Watermill which produces flour as it has off and on since 1575.

This is done by grinding the wheat between traditional millstones and separating bran from the flour in a water-powered wooden sifter, called a dresser.

But now the Bacheldre mill has made two concessions to modern technology.

A few years back, the milling operation was disconnected from the old waterwheel and the two sets of French Burr stones are now turned by a 37kW electric motor.

And more recently, one of the mill’s two dressers was replaced by an electrically-driven centrifugal sifter made by Kason Corporation.

Called a Centri-Sifter® sifter, the machine has roughly 10 times the capacity of the two dressers combined and has proved to be more reliable, says Matt Scott, owner of the mill.

**HIGH QUALITY**

Bacheldre Watermill is a relatively small operation, but it has become famous for its high-quality flour since Scott bought it four years ago.

The mill produces a dozen varieties of flour, most of them organic, for which it has won a number of awards.

Last year, the mill won the UK Soil Association’s award for best organic flour. Scott has also increased production to 10 metric tonnes a week, from 200-300 kilos/week when he took over.

In November 2005, he came third in a UK competition for the best new business started up in the previous three years.

“Our grists are milled using traditional grinding stones to produce slowly and gently milled flour, which retains all the natural goodness of the wheatgerm,” says Scott. This time-honoured process
only slightly warms the flour, he says, thus leaving all the natural
flavours intact.

Modern mills, he points out,
use steel rollers to crush grain
after it has been conditioned in
water to avoid excessive heat
build-up. Even so, he says, it
heated can damage the
wheatgerm, so many companies
remove it.

In Bacheldre's operation,
grain is received in tanker trucks
and bulk-blown into four silos,
from which it is cugered into a
hopper in the mill.

From the hopper, the grain is
gravity-fed onto a scouring and
separating screener that
separates chaff from the grain.
The machine, built in 1976 and
now electrically powered, has
two sloping, vibrating screens,
located above the other.
Chaff is retained by the upper
screen, which has a 5mm mesh.
Grain is collected
on the lower, 2.5-mil screen, while fines fall through
the screen.

The grain falls down the inclined screen onto a
cannel, which directs it into an open, rotating drum
that has baffles and a wall perforated by holes of
about one cm diameter. A fan removes residual dust
and the grain falls through the perforations into an
auger, which feeds a hopper above the millstones.

Bacheldre has two sets of millstones. Each
consists of two flat, circular stones, located one
on top of the other. The upper one, called a runner
stone, rotates (hence its name), and the bottom one
(the beater) is fixed. Grain is fed
from the hopper, through a hole
in the centre of the upper stone.
and is ground into flour between
the stones.

FLOW CONTROL

The flow from the hopper is
controlled by a mechanical
device attached to the mill's drive
shaft that beats against a loose-
fitting shoe at the hopper's outlet.
The ground flour emerges around
the periphery of the millstones,
where it is gathered up by a
paddle attached to the runner
and drops through a hole, either
into a sack or into a vacuum
system that takes it to storage.

The tiny gap between the
stones has to be adjusted for
the type of flour that is required
– the gap is narrower for fine,
white flour than it is for coarse, brown flour.

However, the narrower the gap the less grain can
be fed to the mill, so the flow from the hopper must
be matched to the milling requirement. Both needs
are met by a tentering screw that raises or lowers
the runner and simultaneously raises or lowers the
shoe at the bottom of the hopper to adjust the flow.

Most of the dozen or so types of flour made by
Bacheldre are bagged directly from the milling
operation into sacks ranging from 15 to 25 kilos.
However, white, durum and brown flours require
further processing to remove bran, so they are
moved by vacuum to hoppers that feed the bran-

while the resultant, centrifugal force on the particles accelerates them through the openings. The rotating paddles, which never make contact with the screen, also serve to break up soft agglomerates. The separated flour falls down through a spout and is transported by vacuum to a bagging hopper. Oversized particles (bran) continue through the chamber and are ejected via a discharge spout into a sack and shipped for animal feed.

The Bachelдрre mill uses two sizes of nylon screens: 250 micron for white flour, and 550 micron for durum and brown flours. Screens are available for the Centri-Sifter screener in various other materials, including other types of monofilament cloth, woven wire in selected metals, perforated plate and wedge wire. Scott chose nylon because “we tried it and it worked well”.

In the mill, the new sifter is located next to the remaining water-powered wooden dresser, which is still used for white and durum flours. The dresser is housed in a rectangular wooden box and operates on a similar principle to the Centri-Sifter screener. A rotating shaft, powered by a water wheel via a pulley, runs the length of the box’s interior. The shaft is equipped with brushes and is surrounded by a cylindrical sieve of stainless steel.

Flour is blown pneumatically through an inlet in the top of the box at one end and passes along the interior of the sieve. As it flows along the cylinder, the flour is pushed through the sieve by the rotating brushes and drops into a bag. Bran passes to the far end of the sieve, where larger holes allow the bran to pass through for bagging.

MORE RELIABLE
Besides having a much higher throughput than the water-powered machine, the Centri-Sifter screener is more reliable and does a better job of separating bran from flour, says Scott.

“The old machines broke down about every couple of months and it typically took a day to take a machine apart and fix it. Also, we get a cleaner separation, and it only takes about 15 minutes to change a screen.”

And the multi award-winning, Welsh, artisan, organic flour producer has just introduced fully-compostable labels to replace its foil-based labels, adding the finishing green touch to its existing biodegradable flour packaging.

Derived from a substance called Natureflex, the new labels consist purely of cellulose – or wood pulp – and are coated with a 100 per cent biodegradable adhesive, BioTak, which is suitable for chilled and ambient conditions. The compostable labels are suitable for industrial and home composting.

Scott comments: “With the introduction of these new compostable labels, our packaging is now fully sustainable and is able to achieve biodegradation within just a couple of months”.