

**T**he increasing requirement to reclaim and recycle a greater proportion of primary aggregates and the need to clean materials containing a high proportion of silt have ensured that the washing barrel continues to play a major role in many sand and gravel processing plants.

Barrels have been used to wash aggregates since the very early days of washing plants, and although the basic concept has not changed, the modern day washing barrel has become a far more efficient and user-friendly machine than the earlier versions. Today's barrels incorporate modern materials, resulting in shorter downtime and easier maintenance. This, coupled with the inherently robust nature of this type of machine, means that the barrel remains an important method of washing aggregates.

In essence, a barrel is incorporated within a processing plant when adhering clay or fines need to be liberated from the aggregate to produce a clean product.

Two types of barrel are available:

*Washing barrels:* which turn at a relatively slow speed (approximately 25% of critical speed) and are normally incorporated when the feed material does not require intensive attrition to clean it, or where the material might break up due to its fragile composition and hence create further undesirable fines, eg coal washing.

*Scrubber barrels:* which turn at a more rapid 50% of critical speed. The faster speed of these barrels creates far more material-on-material attrition, causing the fines and clays to be literally scrubbed off the aggregate.

Within these two types there also exist different concepts that allow for flexibility in the overall



# Washing with Barrels

*Matthew Joyce, managing director of Wileman Engineers Ltd, outlines the options available*

design of the processing plant, depending on the material analysis. These concepts essentially revolve around the sand content in the feed and the direction of water flow within the barrel:

*Uniflow:* this concept, as the term suggests, is where all the material that is fed into the machine exits at the discharge end. Generally, most -5mm sand would be removed from the feed before it is fed into the barrel, thus allowing only those fines still adhering to the stone to be scrubbed. All of the water used in this concept enters at the feed end of the barrel and travels in the same direction as the material flow.

*Contraflow:* this concept is

offered where customers wish to scrub 'as dug' feed, including the -5mm sand. Best results are usually achieved when the sand content does not exceed 50% of the feed material, due to the cushioning effect of the sand. Unlike the uniflow solution, the water is introduced into both the feed end and the discharge end of the barrel. Perforated de-sanding meshes are incorporated in the feed end of the barrel, creating a flow of sand and water towards the feed end where the sand is removed for further processing. An addition to this concept is the incorporation of a perforated de-sanding discharge trommel to remove further sand and allow a certain amount of dewatering to take place before the coarser ➤

## Washing & Filter Pressing

The incorporation of a contraflow barrel can provide flexibility in the overall design of a processing plant



material passes over the trommel for further processing.

Barrel washing offers a number of significant advantages. First, the attrition created in a high-speed barrel means that a very clean product can be achieved; secondly, the incorporation of a contraflow barrel in certain circumstances can provide flexibility in the overall design of the processing plant; thirdly, a barrel can handle larger fragments within the feed material; and fourthly, high-tonnages can be achieved through a barrel.

One disadvantage of barrels is that they rely on the break-up of the clays through the action of attrition, but this can cause some

clays, especially those of a plastic nature, to ball up into larger lumps of clay, and therefore such materials are not suitable for barrel washing.

Wileman Engineers Ltd are a leading supplier of scrubber barrels to the sand and gravel and associated industries and have been supplying machines to the major UK aggregates companies since the 1970s. The main features of the Wileman design are:

- a robust barrel design incorporating roller paths that are machined to produce a concentric and smooth drive
- the incorporation of truck

- tyres to both support and drive the barrel, which again provides a smooth, quiet drive and eliminates excessive loading on the supporting structure
- the use of abrasion-resistant rubber linings and polyurethane meshes results in a machine that, with regular maintenance, can last indefinitely
- the water used is introduced at relatively low pressures (25–30 lb/2in) and therefore the machine does not require expensive high-pressure pumps.

Some notable deliveries of Wileman scrubber barrels include: a 33M7 (uniflow) scrubber barrel supplied to Lafarge Aggregates' Dowlow Quarry and rated at 500 tonnes/h of –100mm limestone scalplings; a pair of 33M7 (uniflow) scrubber barrels supplied to CEMEX plc's Doveholes Quarry, each rated at 500 tonnes/h of –125mm limestone scalplings; and a 23M48 (contraflow) scrubber barrel supplied to CEMEX plc's Norton Disney Quarry and rated at 275 tonnes/h of –100mm sand and gravel.

For further information on scrubber barrels or other products supplied by Wileman Engineers Ltd, visit:

[www.wilemanengineers.co.uk](http://www.wilemanengineers.co.uk)



Wileman scrubber barrels are robust and include roller paths that ensure a concentric and smooth drive