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Wash Plant Product Focus







# **High quality** aggregates from the Zambesi **Water Separator**

Based in the East of England Firstgrade Recycling Systems Limited has recently introduced the Zambesi Water Separator (ZWS) to the recycling market.

Ideal for producing high quality aggregates the first system has been installed for Smith Skips in Aberdeen to clean up two fractions (10 to 50mm and 50 to 280mm) from their waste transfer station.

Utilising water separation (undoubtedly the best method) the ZWS has successfully removed all wood, plastics, plasterboard and other waste materials from the incoming feed of recycled aggregate, resulting in a high quality saleable product.

In operation the ZWS uses a fast moving flume of water to separate the light from the heavy materials and through a unique separation system removes items which are heavier than water, (such as rubber and plastics), along with the light fraction.

Applications for the Zambezi include removing light contamination from recycled aggregates, and removing glass and metal from woodchips or mulch.

#### About us:

Firstgrade specialise in the design, manufacture and installation of machinery for the waste processing

Ideally suited to the evolving needs of the skip waste, MSW, wood waste and compost sectors, their main product portfolio includes, trommels screens, vibrating feeders, picking stations, conveyors and elevators, separators using air, magnets and water and vibrating screens.







The company also offer a consultation service involving a site visit, the preparation of a detailed drawing and a proposal to suit your specific needs.

Machines can be designed to make the best use of the space available, which is almost always a limiting factor in waste transfer stations.

#### **Further information:**

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Rapid International, have recently started to supply mixer washout systems into the Romanian market, in partnership with the Powertek Group. These machines fit neatly into their newly launched mobile concrete plants due to their compact and self-contained design features.



Rapid International is recognised as one of the world's leading manufacturers of concrete pan, planetary and twin shaft mixers. Several years ago, having identified a more cost-effective cleaning solution to accompany these mixers, the company set about designing and developing their own washout system to suit the requirements of the batching plant owners. This has now evolved into 3 models - the RJW2 (2 pump system), RJW3 (3 pump system) and RJW4 (4 pump system).

The Powertek Group are a distributor of recognised concrete, asphalt and construction equipment throughout Romania, Bulgaria and Moldavia.

An RJW2, 2 pump washout system has recently been fitted with a Twinshaft mixer on Powertek's mobile concrete batching plant (60 m $^2$ /h capacity). Andrei STANCIU, in charge of the Romanian project says:

"We've selected the Rapid International wash-out system because the washing heads from this wash-out system fitted perfect into our compact designed plant and also because we've worked closely with the Rapid International technical team, who helped us obtain a good solution, somewhat custom made for our plant."

These washout systems are proving extremely popular with batching plant manufacturers due to their time saving features. With one washout cycle, taking just 4 minutes, this results in an increase in the mixer production time and serious reductions in downtime. It also minimises the safety risks as the Jetwash system reduces the need for employees cleaning inside the mixer.

Time is not the only saving with the Jetwash system. Using this powerful system, batching plant owners can save money on having to change mixer parts frequently. The washout system prevents a build-up of concrete and damage to the components. It also ensures overall reduced wear with the mixer, giving it a longer life span.

With the RJW2 model for Twinshaft mixers, the RJW3 model for pan and planetary mixers and the RJW4 model for  $4\text{m}^3$  mixers and above - there are several options to suit customer's requirements when choosing a mixer washout system.



# **Mobile washing** employed on major canal project in Turkey

Eren Construction has taken delivery of a new mobile washing plant for use on a major canal construction project in Turkey. Eren Construction are the principal contractors for the final 63km section of the 221km canal which will take water from the Attuturk reservoir for the irrigation of agricultural land in the east of Turkey during the hot summer months.

On winning the project Eren Construction ventured into aggregate production for the first time in an effort to reduce costs and increase control over the supply chain. The initial investment involved the purchase of two mobile crushing and screening plants.

As the project developed in became clear that the material being blasted and excavated on site to be reintroduced to the canal construction project required a washing process in order to be able to deliver the quality of sand and aggregates required for use in the civils. "The dry crushing and screening process served our purpose adequately in the early stages of the project but as time went by we soon realised that washing was needed due to the volume of silt and unwanted fines in the excavated material" explains Mr. Yasar Eren, Chairman of Eren Construction. "The nature of the project required that the washing plant be mobile as it would be moved every few months as the project progresses towards completion."

It was at this stage that the M2500 mobile washing plant from CDE was introduced to Eren Construction. "The M2500 offered the mobility that we needed while also ensuring that the sand and aggregates we produce are of the highest possible quality due to the very efficient removal of silts from the feed material" says Mr Yasar Eren.

Eren Construction are one of the leading multi-disciplinary construction companies in Turkey and have a portfolio of many large civil engineering projects including roads, viaducts, underpasses and sewage pipelines as well as experience in residential and commercial construction.

This canal project is the first time that Eren Construction have been involved with the production of their own sand and aggregates for use on a project. Previous to this the company would have used large quantities of river won aggregates but new legislation in Turkey required that they explore other avenues of supply. "Carrying out the washing and screening in house has been a big experience with a lot of learning in the process but other aggregates projects are inevitable now with the new legislation so it has been a positive step for the company" explains Mr Yasar Eren.

The construction of the canal requires the blasting and excavating of both limestone and basalt with an estimate that approximately 13m cubic metres of earth will be removed. The limestone will be used as backfill to create the graded slopes for the canal while the basalt is being used in construction of the civils. "We needed to excavate the basalt to create the canal so it made sense logistically to use it for aggregates" says Mr Yasar Eren. When complete the canal will measure 10 metres wide at the bottom with graded 12 metre banks on each side allowing for a water depth of 6 metres.

In addition to the two mobile dry crushing and screening plants and the M2500 mobile washing plant there are also mobile concrete plants on site with a fleet of ten mixer trucks to deliver material to the construction sites. The M2500 is being fed a rate of 125 tons per hour from the dry crushing and screening plant and is producing four products - 0-4mm sand and 4-15mm, 15-22mm and +22mm aggregates.



Once material has been delivered to the M2500 E4X the feed conveyor delivers the material to a double deck ProGrade P275 rinsing screen fitted with wire mesh on both decks. The +22m material is removed by the top deck and the 15-22mm by the bottom deck and these products are stockpiled by the integrated 9m wing conveyors.

The -15mm material is sent to the integrated EvoWash sand washing plant where a split screen allows for production of a 4-15mm aggregate and 0-4mm sand, once again discharged to stockpiles via the integrated conveyors. It is the hydrocyclone technology employed on the EvoWash that allows for the effective removal of silts from within the feed material while the high frequency dewatering of the sand ensures that it is discharged at 12% moisture, ensuring it can be used in the production of concrete very soon after production.

In addition to processing the newly excavated material the M2500 will also be used to process some 60,000 tonnes of material that has been stockpiled on site awaiting the arrival of the new washing plant. "The M2500 has been a very good solution for us" explains Mr Yasar Eren. "Not only has it allowed us to effectively deal with the issue or excess fines in the dry screened material but the mobility of the unit fits in with the requirements of the project perfectly. The whole installation and commissioning of the new washing plant was completed very professionally by CDE and given the quality of the final products this is a process that we will be using in future on other large civil projects that we are involved with."



WLODAN





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

The 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, e.g. coal washing.

**Scrubber barrels:** These turn at a more rapid 50% of critical speed. The faster speed of these barrels creates far more material-onmaterial 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 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

**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

**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 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 clay, 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.







Complete Utilities is a civil engineering company established over 20 years ago based in Gloucestershire. Whilst their main business is 'digging holes in the road' in recent years the emphasis on treating wastes has led them to develop recycling operations so they can deal with their own wastes.

After investigating some of the common routes to recycling construction and demolition wastes Complete Utilities commissioned a wash plant from DUO. Whilst a more expensive route the wash plant demonstrated it was able to operate effectively in all weather conditions producing a consistently high quality product.

The main element of the processing plant is a Powerscreen Aggwash which washes and grades the trench spoil the company generates in its utility work. The Aggwash system initially rinses the feed material and screens off any oversize, an overband magnet on the feed conveyor removes any ferrous metal from the material before it enters the logwasher. Whilst in the logwasher the material is agitated by two rotating shafts each fitted with high tensile paddles, this scrubbing action removes any clay and floats off light weight contaminants onto a

dewatering screen. The scrubbed aggregate is the fed onto a second screen which gives a final rinse as well as sizes the aggregate so that it can be stockpiled as three usable products. The underflow from all of these processes goes to the built-in sand plant which removes the silt content and dewaters to produce a single grade of sand; the waste water is then pumped to the water treatment system to ultimately be reused by the Aggwash as part of a closed circuit system.

A notable feature of Complete Utilities wash plant operations is that it runs from a small yard demonstrating that you don't need a big site with lagoons to run a wash plant operation.

The graded aggregate from the wash plant is blended to meet the specification for a type 1 aggregate material. The whole process is quality driven and the operations are controlled by a factory production control process. Testing is carried out on the recycled aggregate products to confirm it meets British Standards. This is detailed in a 'Quality Protocol' the company has developed specifically for its wash plant. This complies with the guidance of WRAP (Waste Action Resources Programme) and confirms that the recycled aggregate Complete Utilities produces meets a specified standard and is not a

The washing plant now accounts for 100% of the companies requirements for aggregates. The residual is silt

fines which the company is investigating further treatments options such as combining with cementatious materials or composting materials to give a full diversion rate of 100% from landfill.

This is a major investment for a company of this size and has been recognised with the project being a finalist in this year's NJUG (National Joint Utilities Group) awards in the 'Sustainable' category competing with major national companies such as Balfour Beatty and Laing O'Rourkes.

### **Latest News**

# Complete Utilities are winners of the NJUG Sustainability Award 2011 with Wash Plant

Complete Utilities win the 2011 Sustainability Award for it wash plant recycling operations. At a Ceremony at the House of Commons Complete Utilities beat off the tough competition to scoop the top Award. Accepting the award Steve Chaplin, Managing Director, said "It is great to get national recognition our recycling efforts - we're committed to environmental issues, minimizing our waste and recycling as much as possible. This award shows how the hard work of my team and how our wash plant makes a real difference. I'm delighted particularly given how tough the competition was.'





Based in Great Blakenham near Ipswich, Suffolk, JT Few Plant Hire Ltd (JTFPH) is the latest company to invest in the new award winning Powerscreen ™ Aggwash mobile wash plant.

Offering plant hire, road haulage and recycling services in Suffolk, JTFPH also supply bulk aggregates and other materials for use in the building and construction industries.

#### Washing for the first time

Having only previously crushed and dry screened materials the company made the decision to invest in a wash plant which would enable them to add value to the material and provide quality materials to existing and new customers. Additionally, this investment would also allow them to process material previously untouched due to the high clay and high moisture content.

After almost 2 years of market research and subsequent site visits to view wash plants JTFPH made the decision to purchase the Powerscreen <sup>TM</sup>Aggwash from industry leading, specialist washing equipment supplier DUO (Europe) plc. of Coventry,

West Midlands. In addition to the supply of the Aggwash, DUO also designed, installed and commissioned a plant which included a full water treatment system based around a centrifuge which was specifically selected for its compact size, low operational cost and ease of maintenance.

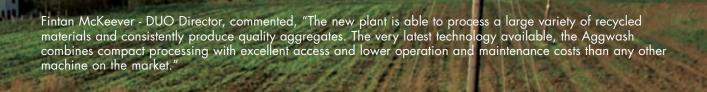
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#### The Installation and its Financial Benefits

Working within planning regulations (max 6 metres height) the water treatment solution supplied by DUO perfectly complements the Aggwash and provides a compact size plant relative to required production levels. As JTFPH had only previously crushed and dry screened materials it was essential that the incoming contaminated waste feed was dealt with in compliance with the Environmental Agency regulations which would not allow any waste water being sent to a lagoon.

To deal with this issue the DUO team specifically designed the water treatment element to incorporate a closed circuit system which not only guarantees the cleanliness of the product, reduces water usage, eliminates ingress into the ground and consequently promotes sustainability. The end result being that the centrifuge consistently produces an excellent cake, the low moisture content of which is vital to ensure that the material will be accepted by landfill sites.

The centrifuge is supported by a sludge tank, clarified water tank and a thickener system. All site water is collected and pumped into the plant to prevent any water going off site, with the silt from the centrifuge (20 tph of cake) being stockpiled for disposal off-site. This reduction in the volume of waste material has provided JTFPH with considerable savings on any landfill costs. The disposal cost of the material that does go to landfill is reduced further due to the cake's greatly reduced water content and consequently lower weight.



### A working partnership

dog

Installed within a four week time frame the new plant is controlled by a fully interlocked PLC which runs the plant automatically. Processing recycled aggregates at 55 tph the Aggwash produces two sands, a gravel and washed oversize. Designed to process a large variety of recycled materials, the process efficiently removes metals, trash and clay from the feed material subsequently providing saleable materials for use in all building projects including concrete, drainage and pipe bedding.

Jonathan Few - Director, commented, "The new plant is exceeding our expectations and current processing requirements. It is proving to be an excellent investment that will provide us with more saleable products whilst promoting sustainability and we can feel secure in the fact that we have the benefit of the DUO team and all their expertise behind it."



#### Award winning

The Powerscreen® Aggwash is an award winning mobile wash plant that brings together for the first time rinsing, screening, scrubbing and sand washing capabilities on a single transportable chassis. Primarily designed for the processing of construction & demolition waste but equally suited to virgin material applications it is capable of producing four grades of aggregate and a single grade of sand at up to 60 tonnes per hour.

www.hub-4.com/directory/680

## **Dig A Crusher Provides Money Spinner**



A Rotar 900R screener bucket has helped a Nottingham-based company overcome a 17-year old materials processing problem, converting a tricky and sticky waste into a saleable commodity.

Nottingham-based North Midland Construction (NMC) is a rare find; a national civil engineering and building contractor that is a jack of all trades but appears to be a master of all of them. Operating as five individual divisions and subsidiaries, NMC undertakes construction projects covering water, power, utility, energy from waste, rail, road and civil projects, urban regeneration, environmental, and infrastructure work, and well as having its own mechanical, electrical and building companies.

#### **Recycling Requirement**

Obviously there is a huge amount of waste material from its construction and utility work that needs to be processed and recycled as a result. Alongside the company's state-of-the-art headquarters, NMC has its own recycling centre, where construction and demolition waste can be separated, screened, processed, crushed, sorted and eventually reused.

However, because the majority of the geology in the Midlands has an overlaying cover of heavy clay, the processing of groundwork material has proved difficult as yard supervisor Kevin Morton explained. "We can remove stone and brick from the waste easily enough. We'll bring in a muncher to deal with rebar. We can screen and trommel the vast majority of the material whilst it is dry. But the moment it gets wet, the trommel blocks up and the screener simply isn't efficient enough to warrant trying to separate the waste," he says. "As a result it gets stockpiled until it's dry enough to process again. Except it rarely is. As a result we had a yard full of a highly sticky waste product we simply couldn't separate. As a result we accumulated a 7 metre high waste

pile that was slowly enveloping the yard; one that the Environment Agency really took offence to. They refused to grant a further licence to hold more - although a different category - waste material, until we had found an answer to our existing waste stockpile

#### Rotar to the Rescue

Help came in the form of a Rotar 900R rotating screener bucket from Middlewichbased Dig A Crusher that NMC saw in action at last year's Hillhead exhibition where one of the uses demonstrated by the rotating bucket was aggregate washing.

Suddenly realising they had stumbled on a possible solution to their muddy waste, a

demonstration machine was soon on its way to NMC's Huthwaite yard. It proved so effective that it never left, and after a two week hire, it was purchased outright.

The bucket was fitted to an existing 21 tonne Komatsu excavator and work began in earnest. "The Rotar worked through the top layers of the stockpile quickly because it was fairly dry and uncompacted. We removed the top quarter of the stockpile, processed and washed it without problem. After this we had the moist sticky mess left, which was more akin to thick mud with stones; a totally useless material that was destined for landfill. It had totally compacted through years of sitting in the rain," Morton continues. "But we stuck with the bucket but, because of the high wet fine content, we started to use it in a different way. We took to pre spinning the material before washing. This took out quite a bit of the fines. We then did a prewash, which took out the majority of the mud, before a final clean wash, this was simply to prevent having to constantly empty the skips that were used as the washing bays. The resulting material makes an excellent Type 1 product and we've since discovered that it also makes excellent clean drainage material, which the local farmers love, so we have yet another market for the aggregate."

### **Quality over Productivity**

Kevin Morton readily admits that the system used to process this difficult material is not achieving high throughput levels but, he says, he is willing to forego productivity for the sake of quality and to finally tackle a 17-year old problem. "Although the way in which the bucket is used isn't going to win any production records, we now get two saleable products from rubbish. Topsoil can be separated in the wash programmes, allowed to drain in settle tanks and then used as clean backfill, whilst the real moneyspinner, the clean aggregate can be recovered easily. We've opted for quality over speed and it's paid off," he concludes. "The original stockpile is now down to just a quarter of its original size. We have found the only machine capable of processing such a sticky product. Our operators love it for its ease of use, simple maintenance and the fact that we are starting to get our yard back. It is a brilliant solution to a problem that has plagued this yard for too long."





Aggregate Processing Solutions has provided an uprated Terex Finlay TC 15 Sand Master to boost productivity on site at Hanson Aggregates in Mercaston, Derbyshire.



The machine has been brought in as part of a 28-week contract, which will see the sand and gravel quarry produce volumes that would normally be achieved over an 18 month period.

With a processing power of up to 120 tonnes an hour of sand, the modified TC 15 offers a quick and efficient way for the quarry to meet tight deadlines and product specifications.

The TC 15 works with a chassis mounted, Terex Finlay MP300, mobile washing system, a Terex Finlay 390, two Terex Finlay 532 conveyors for sand stockpiling and a Terex Finlay 683 producing three grades of gravel.

Brought in to replace an older permanent static system, the TC 15 has two 24 inch cyclones and produces a -2mm fine sand to meet Hanson's specification.

Raw material is stockpiled before being fed by the 390 to the MP300 washing system.

Sand from the on-board rinsing screen then flows to the TC 15. Plus 2mm gravel passes through the integral Terex Finlay 206 logwasher, which delivers onto a de-watering screen which has been configured to produce a 2mm - 5mm grit product.

Anything above 5mm is fed through the Terex Finlay 683 Supertrak in order to produce three grades of gravel, 10mm, 14mm and 40mm.

The TC 15 Sand Master's low level feed-in and easy to access pumps helps keep maintenance simple.

As well as rubber lined centrifugal pumps and impellers, an electric control panel is fitted as standard, which facilitates two 7.5 Kw stockpilers, enabling the sand system to be easily incorporated into an existing washing arrangement.

Andy Bull, the quarry manager at Mercaston Quarry, said; "The TC 15 Sand Master is quick and versatile, and is extremely compact and easy to locate, even with the uneven ground we have here.

"It deals with our time, space and surface limitations really well and is a durable, fast working machine.

"Importantly, it uses under half the amount of electricity and water that was consumed before, saving the quarry a lot of money."

Bob Parker, the contracts manager from Aggregate Processing Solutions, said: "The TC 15 is perfect for the fine sand at Mercaston and has enabled us to meet our contractual obligations in terms of production and product specification."

Hanson is part of the Heidelberg Cement Group, which is the global leader in aggregates and has leading positions in cement, concrete and heavy building products. The UK business - Hanson UK - is a leading supplier of heavy building materials to the UK construction industry.

www.hub-4.com/directory/1824

# **Centrifuge** developments for the aggregate and recycling industry

Protecting the environment and reducing the amount of sludge from being tipped or stored in lagoons has prompted Baioni to develop methods of collecting and dewatering sludge's from aggregate washing plants.

Over the last fifteen years Baioni have followed a policy of developing the Centrifuge specifically for the aggregate and recycling industry.

Many are well established in the UK and worldwide and are proving to be very efficient at collecting and dewatering sludges from aggregate washing plants and recycled aggregate plants.

This method of dewatering allows for the solids to be disposed of in dry landfill or to be used on restoration in quarry areas, more recently the use of the solids a capable of being used in hydraulically bound materials, the water reclaimed from the process is clean enough to be returned to the washing plant for immediate reuse.

The process starts by taking the flow of silted water after a hydrocyclon unit (Baioni GRF hydro cyclone and dewatering screen) this produce a silted water with a solids content of minus 63 microns, this is collected by a thickener tank where the material is settled to a density of around 1.3, this sludge is then pumped to a agitated buffer tank this give a constant supply to the Centrifuge at a controlled density.

The next stage is to pump it to a Centrifuge, prior to entry it is dosed with a small amount of flocculent this gives the water a very good clarity, which can be returned to the washing plant for reuse. The sludge is centrifuged at high speed and gives dry solids of around 58 to 62 % dry. This is a solid that can be handled easily for transporting and will not release any more water due to the high centrifugal speed that it has been subjected to.



The main advantages of the BAIONI Centrifugal decanter systems are they are small and compact compared with other methods being used today, the cost of maintenance is also low, with minimal operator control needed as they are fully automatic, controlled by its own dedicated plc

**BAIONI BAIDEC** Centrifugal decanter come in 9 model sizes capable of producing solids from 1 tonne per hour to 20 tonne per hour

**BAIONI THICKENER** Come in 5 model sizes from 4000 litres per minute to 13500 litres per minute

**BAIONI GRF** Hydro cyclone and dewatering screens come in 10 model sizes

Baioni crushing plants consider it to be more than just a supplier. It offers real help and support to every customer, with whom it does its best to co-operate in a reliable and genuine manner striving to achieve mutual satisfaction and success

Safety is a big issue with safety devices required under the EEC machinery directive 2006/42/EC





