



## Case Study

# **Washing the Fines - Additional fines Product together with improved Water Utilisation**

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A Swedish quarry wanted to improve the quality of its products as well as its economics. Therefore they got their sand and gravel washing plant extended which now utilizes fines in the washed sands and aggregates.

(From the archive of "[bulk solids handling](#)", article published in Vol. 34 (2014) No. 2 , ©2014 bulk-online.com) Bröderna Björklunds Grus AB is a rock and gravel/sand quarrying company located in Olofström, Southern Sweden. The company produces rock, gravel and sand products. CDE completed installation of a new sand and gravel washing plant at the company's main quarry in Olofström in September 2013. The turnkey plant has been specifically designed for both the company's specific requirements and the climate in Sweden. Bröderna Björklunds Grus AB was founded in 1922 by the grandfather and great-grandfather of the current owners, Peter and Thomas Björklund. Bröderna Björklunds Grus AB operates three rock and gravel/sand quarry pits in Marieholm, Vånga Krossen and Fjälkinge. The company's main focus is the production of topsoil, sand, gravel and crushed rock products which have wide reaching uses. The topsoil and natural stone products are used in garden and landscaping projects. Sand, gravel and asphalt are supplied to various concrete factories in Southern Sweden and the crushed rock is used in road construction and various construction projects. The material produced by Bröderna Björklunds Grus is CE certified and meets all

requirements for ballast production.



The new sand and gravel washing plant of Bröderna Björklund Grus in Olofström. (Picture: ©CDE Global)

The owners of Bröderna Björklunds Grus, Thomas and Peter Björklund, originally purchased a CDE Evowash in 2007 in order to capture fine sand which was being lost from an existing traditional washing system which incorporated a bucket wheel. Then in 2013 the decision was made to increase their washed sand and

aggregate production and CDE was the natural choice to provide the solution. "We had previously purchased a sand washing plant from CDE which was effective at ensuring we did not lose fines material. We are a dynamic and specialised company and wished to increase the flexibility of the types of products we could produce so we decided to upgrade to a new CDE system. We considered several options for their new washing installation, but it was the CDE expertise, their ability to deliver a fully modular solution with the lowest cost per ton of ownership, and fully backed performance guaranteed outputs that separated CDE from other providers." CDE was presented with a natural sand and gravel feed material which contained high levels of minus 250 µm material. Björklunds Grus required a 200-tph plant that would produce three washed sands and two washed aggregates; a 0-0.25 mm ultra-fine sand, a 0-2 mm fine sand, a 2-8 mm concrete sand, a 8-16 mm aggregate and a +16 mm aggregate. The customer had several specific requirements for the project. They required an option within the design of the plant for mixing & blending their 0-0.25 mm, 0-2 mm and 2-8 or 2-5 mm sands when required. The plant should also be mobile so they could potentially move the system to any of their other quarries. It was also essential that the plant should integrate with the current CDE Evowash onsite and that it could successfully operate in the extremely cold temperatures experienced in Sweden. These factors, and analysis of the material at the quarry, required that CDE design a bespoke solution for Bröderna Björklunds Grus.





Olofström sand and gravel washing plant - the other side.

Following a sieve analysis at the Olofström quarry, the equipment specified for this project was a M2500 E4X mobile washing plant with integrated counter flow classification unit (CFCU) due to the high volumes of minus 250  $\mu\text{m}$  sand and an Aquacycle A600 thickener. The Aquacycle was required to ensure the correct amount of water was supplied as water on site is limited and to condense the waste sludge into a high concentration slurry. These products would successfully

integrate with the existing Evowash 71 fines recovery system already installed. The existing Evowash enabled the system to output 5 fractions in real time, under computer controlled classification. Also, due to the project location and specific requirements for mixing the two sands, the plant would have two new and unique features that were being tried for the first time by CDE. This would be the first project that a dual sand conveyor with a diverter system would be used and it would also be the first time a 'winter pack' Glycol system would be used to combat frost.

## **The Process**

The raw feed is delivered to the M2500 E4X via a S20 integrated hopper with a capacity of 20 tons. The material travels up the feed conveyor with a fitted belt weigher which enables Björklunds Grus to quickly and easily monitor the flow of material through the plant while also having real-time access to operating capacity information. The belt weigher is an enhancement package under CDE Plantplus which enables existing customers to add enhancements to their plant after purchase. The material enters the Prograde screen which is fitted with 18 non-bolted Isenmann modular polyurethane panels. The +16 mm material is removed on the top deck and stockpiled using the first of the M2500's four conveyors. The bottom deck of the ProGrade is a split screen where the first part of the screen has smaller apertures where the 0-2mm material can pass through and further down the screen deck, the apertures are larger to allow the 2-8 or 2-5 mm material to pass through. The remaining 8/16 mm is removed on the bottom deck. The Evoscreen dewatering screen on the integrated Evowash sand washing plant is a split dewatering screen to allow two sand sizes to be dewatered at once and the 2-8 or 2-5 mm material is transferred via jet pump to one side of this Evoscreen. Design engineers at CDE introduced an innovative concept to meet with Bröderna Björklunds Grus' requirement for mixing their 0-2 mm and 2-8 or 2-5 mm sands when required. This is a dual sand conveyor with a diverter system that allows the conveyors to be moved hydraulically to match the screening mats in the dewatering screen. The chassis of the machine has been redesigned to have two supporting legs at each side rather than one central leg which stabilises the plant in order to perform the conveyor adjustment. This unique feature has since been introduced as a permanent design enhancement as a result of the success of this Swedish project. After dewatering on the Evoscreen, the 2-8 mm material is stockpiled via the third M2500 conveyor. Meanwhile a sand pump transfers the 0-2 mm material to the next stage of processing. The CFCU (counter flow classification unit) uses upward flow classification to separate particles by density and eliminates the oversize sand

particles from the final sand product. The CFCU operates successfully in this project due to the inclusion of a Glycol system, a first for CDE. Glycol was used in place of air to ensure maximum uptime in the coldest conditions. The Glycol system is required for the extreme temperatures experienced in Sweden in winter. The Glycol acts as antifreeze and ensures that the pinch valves, which are used to discharge the fine material from the CFCU tank, can open and close successfully despite the cold temperatures. The 0-2 mm material is sent to the second half of the Evowash dewatering screen for stockpiling via the fourth conveyor on the M2500. The CFCU overflow contains 0-0.250 mm material, which still contains valuable product and therefore is transferred to the next stage of processing, the Evowash 71. Here the material enters the Evowash sump, is pumped to the hydrocyclones and a fine 0.063 – 0.250  $\mu\text{m}$  sand is dewatered and stockpiled on a fifth conveyor. The fine material removed in the CFCU through the two 500 mm hydrocyclones is sent to the Aquacycle A600 thickener, along with the 0.063  $\mu\text{m}$  material from the Evowash hydrocyclones. The thickener recovers up to 90 % of the water used in the plant and complies with ever-increasing environmental requirements from planning authorities. Mr Bjorklund commented, "Our company prides itself on using the best technology in its operations and avoiding anything that may be harmful to the environment. The Aquacycle ensures we have a clean, safe and efficient site at all times as a result of reduced waste water management requirements." Eoin Heron, Senior Sales Manager for CDE in Europe also commented on the benefits of the Aquacycle for the company, "The Aquacycle significantly reduced the sludge basin requirement, saving Bjorklunds significant excavation costs while ensuring minimal environmental impact. This lead to many advantages, especially with planning requirements." The company invested in CDE preventative maintenance inspections which Mr Heron explains are proven to have a positive impact on plant production levels. "The CDE performance guarantees ensure that the customer has visibility of expenditure through a fixed cost agreement and our regular PMI inspections guarantee maximum efficiency and productivity. Investment in a CDE PMI package means our expert technicians will visit a customer's site on an agreed number of times every year which can be easily continued as a regular contract. These specialised engineers provide support and guidance to our customers and a detailed understanding of how the plant is performing to help them to maintain plant performance at the optimum level and achieve high quality end products." The plant has been operating successfully since September 2013 and Mr Bjorklund is confident that he has made the right decision in choosing a CDE solution. "The sand plant means that we can maximise our customer base and offer our products for specialised applications such as golf sands and play-ground sands. The plant is extremely flexible. We can control the

mixtures to achieve the optimum screening curves for customers. This is very important, especially for the concrete and dry mix industry which needs an optimum screen curve to keep costs down and maintain constant product quality. As discussed at the outset of the project, the plant as a whole can also be relocated to another quarry with ease which will allow our company to keep producing sand and gravel for a long time to come.”

#### **A Note from the Editor**

For all statements in this article that refer – directly or indirectly – to the time of publication (for example “new”, “now”, “present”, but also expressions such as “patent pending”), please keep in mind that this article was originally published in 2014.

#### **About the Author**

**Sorchá Simpson** Brand Manager  
CDE Global, United Kingdom