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SHALE QUARRY TO PRODUCE
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LINARI STONE CO
STE 224B
P O BOX 774
LINCOLNSHIRE IL 60069-0774

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TAKING THE LEED

MARYLAND'S COMUS STONE PRODUCES LEED-ELIGIBLE STONE FROM A FORMERLY CLOSED SHALE QUARRY.

By Mark S. Kuhar

CHALLENGE:

Producing LEED-qualified stone from tailings at an old shale quarry.

SOLUTION:

A portable crusher: the Mobirex MR 110 Z EVO impactor from Kleeman.

TIP:

The portable crusher helps eliminate excessive handling of material, saving diesel fuel, rubber tires and emissions.



A closed shale quarry in Maryland formerly used to produce pyro-processed lightweight aggregates has a new life, producing LEED-certification-eligible aggregate from remaining waste materials unsuited for expanded shale production.

There, a sophisticated mobile tracked impact crusher feeds one of two mobile screens to produce value-added material as needed at highest cost efficiency.

"It's an immense quarry, 1,200 acres all

around," said Brad Hill, Comus Property, LLC, d.b.a. Comus Stone, Woodsboro, Md. "The owners mined shale, but when they ran into harder limestone aggregates that don't expand, they stacked them in tailing piles off to the side. And that's what we're after."

The quarry is situated in the foothills of the Catoctin Mountains. Expanded shale was produced from 1962 to 2008. Hill's plan was to purchase the property with an eye to reclaiming some 13.9 million tons of tailing piles,

and from them producing aggregate gradations that are eligible toward LEED certification of construction projects.

Comus Stone's products are marketed through Comus Property, LLC, Dickerson, Md. Comus sells a range of stone products for structural, architectural and landscape use, offering reclaimed dolomitic limestone boulders, and crushed shale for structural fill, pipe bedding, paver base, and walkways. Its reclaimed stone products are 100 percent pre-consumer recycled material.

"One of our products is a modified CR6 stone, which some jurisdictions call 21As," Hill said. "It's a subbase material for parking lots and road base, a minus 1.5-in. material with dirt in it, because the tailings are dirty. People who do not need pure, high-end CR6 love it because it's sold at a reduced rate."

The quarry's range of materials is sold throughout the construction industry. "It's a full spectrum," Hill said. "We sell the subbase material, stone and stone dust products, all the way up to washed products for septic waste filtration."

The quarry also sells a large quantity of No. 2 stone, 3-1.5 in. in size. "We sell quite a bit of it, primarily as a drainage stone with a good air void ratio," Hill said. It's also sold at certain times of year for use in entrances to construction sites, where the size removes mud on truck tires leaving a job site.

Proofing the Product

Comus Stone started slowly as its managers refined its unique business model. "We first improved the product by renting and experimenting with different crushers and screens," Hill said.

"The first thing we did was bring a screen in, and began processing blast rock and tailings. Sure enough, we saw the result had the aggregates we wanted. We then sought customers and found we were able to sell product immediately. That meant we then



needed to experiment with crushers."

After investigation – Hill admits he was in construction, not quarrying, and had a lot to learn – he decided on impact crushers. The property still exhibits a substantial aggregate production and pyroprocessing infrastructure, including stationary crushing and screening plant, and two rotary kilns, and Hill studied how that equipment could be put to use. But soon thereafter he settled on the new mobile equipment that could process the existing shot tailing piles efficiently and economically.

"We realized that the Kleemann operation was more economical to operate, so we ceased putting money into rebuilding the facility and pursued the new equipment," Hill said.

That was aided by Hill's long-term experience with distributor Elliott & Frantz, Inc., Jessup, Md. "I began my career in earthwork and utilities, and my very first machines were pur-

chased from Elliott & Frantz," Hill said. "That was the beginning of our relationship, and because of their service, I've stuck with them ever since."

When it came time to make a decision on crushers, Comus listened to a wide variety of manufacturers. Some suggested jaws or cones. "We felt that was the wrong direction for our product," Hill said. "It tends to fracture, and in a jaw crusher will become shard-like, a long, angular product that we didn't like. We can't have to apologize for our product; we have to compete with the best. And the impactor gave us a better quality product. Kleemann knew that from the beginning, that with limestone, impactors are the superior crushers."

After examining the crusher and screen options, Hill decided on Kleemann. "Kleemann makes an extremely high quality product," he said. "The crusher is well-engineered. It's extremely heavy and well-built. They didn't cut corners anywhere. Kleemann was showing me real quarries that were using their crushers, while other makers were presenting recycle yards with crushers that were hauled

around on low boys and called portable plants. I needed mobile equipment that would advance toward a bench or stockpile, and then back away from it. That's why we have these quarry machines on tracks."

In reality, Comus is not working from a bench that is shot, but from existing tailing piles, and that poses problems of their own. "Tailing piles are moist, and there's a moisture issue in the prescreening process," Hill said. "We're learning how to deal with moisture in our shot rock, and it's enough to make your hair stand on end. But our screens deal with it."

State-of-the-art Crushing

The crusher chosen by Comus was a Mobirex MR 110 Z EVO impactor. The MR 110 Z EVO has a feed capacity up to approximately 350 tph, with maximum feed size of 36 x 24 in. Its hopper capacity is 5.2 cu. yd.

The new EVO design combines refinements of all individual components with a new material flow concept. The efficient material flow concept of the EVO models

eliminates all restriction to the flow of the material throughout the entire plant. For example, the discharge chute under the crusher is 4in. wider than the inner width of the crusher, and the subsequent discharge belt is another 4in. wider than the discharge chute. Material is thus transported quickly and carefully away from the critical area under the crusher, with flow rate increased, and wear reduced.

The independent vibrating double-decker pre-screen, a Kleemann specialty, improves the EVO line's cost efficiency. In the EVO plants, vibration of the pre-screen and vibrating feeder below the crusher have been improved. Together with a newly designed crusher bypass – which features changes to both form and geometry – the entire system has been relieved of load and a significant contribution has been made not only to increased performance, but long-term life of the EVO models.

The impact crusher is complemented by the Mobiscreen MS 19 D triple-deck screen, and a Mobiscreen MS 15 Z double-deck screen.



Comus feeds raw tailings via excavator. "The operator can see every ounce of what goes into the feed hopper," Hill said. "With a loader you can't see what you just put in. Because these are piles of shot rock with some deleterious material, you run the risk of placing something in your crusher that was buried a long time ago. We really like the fact that the excavator operator has a remote control for the crusher with him, and he can shut down the crusher immediately if he sees something fall out of the bucket that he doesn't like."

In fact, the excavator operator is positioned higher than the rest of the plant, and he can see all stacking and conveying equipment, as well as crusher and screen. If aggregate becomes stuck, or a belt breaks, the excavator operator can stop the process.

The crusher's prescreen removes any deleterious material before it enters the impactor.

"Without it, the impactor would spread dirt through the entire system," Hill said. "We use the MS 15 as a scalping screen to separate dirt, but sometimes we're in deposits that are pure stone and stone dust. There's no sense sending stone dust into the EVO; instead the prescreen pulls the stone dust out and makes a product out of it, while sparing the impactor of needless wear." The stone dust is sold as a base for horse arenas in the region.

"We are making a unique product here, which is a timely product," Hill said. "Plus, Kleemann has helped me achieve what we have right now. Wirtgen Group is in here even when we don't call them, and so is Peter Schaeffer of Elliott & Frantz. They all are genuinely interested in how the equipment is working, or how did we get through the moisture issue. They're learning from me, and I'm learning from them." ❖

There's Value in 'Waste'

The product that comes out of Comus Stone's plant is "green" on a number of levels, according to Brad Hill, Comus Property, LLC, d.b.a. Comus Stone, Woodsboro, Md. "We don't have to mine the material or expend any energy mining it," he said. "Instead we are reclaiming sufficient product above ground. We are making the product with a very efficient means of production, thanks to new equipment that processes it with very little energy. And because the equipment is mobile, we can locate the equipment and process stockpiles in areas of the property that are easy for customers to access, eliminating excessive handling of material, and saving diesel fuel, rubber tires and emissions."

The mobile, tracked equipment acquired for this startup is a Mobirex MR 110 Z EVO impact crusher, a Mobiscreen MS 19 D triple-deck screen, and a Mobiscreen MS 15 Z double-deck screen that can serve as a scalper, all from Kleemann. The two screens are used alternately with the crusher, depending on the product desired.

That there is value in "waste" materials is a benefit of the Leadership in Energy and Environmental Design (LEED) program, which recognizes environmentally sustainable building and neighborhood design. LEED certification is administered by the U.S. Green Building Council.

The industry has turned to the LEED system to evaluate the degree of "green" design a structure or development incorporates. The LEED Green Building Rating System is a voluntary third-party rating system in which credits are earned for satisfying specified green building criteria. Projects are evaluated within five environmental categories: Sustainable Sites, Water Efficiency, Energy & Atmosphere, Materials & Resources, and Indoor Environmental Quality.

Certified, Silver, Gold and Platinum levels of green building certification are awarded, based on the total credits earned.

The LEED standard has been adopted nationwide by federal agencies, state and local governments, and interested private companies as the industry standard of measurement for green building. The new LEED-ND (for Neighborhood Development) category focuses on complete residential, commercial and mixed-use projects developed by a single entity.

Materials produced by Comus Stone might qualify for LEED Materials & Resources credits based on diversion of construction waste from landfills, resource reuse, recycled content, and use of regional materials.

"Our materials are used at the very beginning of a project, so a project manager can get a head start, or bonus, toward accumulating points toward LEED certification," Hill said. "We give them material that is a documented product that is 100 percent pre-consumer recycled material. Our product is accepted, its gradation is correct, and its quality is there."