

HOW TO INCREASE FRAC SAND PRODUCT YIELD

There is a direct correlation between wasted product – which sometimes could be as high as 50% -- and the process system efficiency at a frac sand manufacturing plant. The solution to minimize waste and increase profits lies in the optimization of plant product yield.

Product yield in relation to the product mined is key to the economics of a plant's operation. In a frac sand operation, the product yield is the relation between tons of product processed for sale and the actual tons of material mined. This product yield ratio should be in the neighborhood of 75%.

In order to improve frac sand product yield, the following is a recommended course of action:

1. Verify that the main crusher is adequately sized for the vertical shaft impactors (VSI). This equipment tends to choke easily due to limitations at the feed point. The rock size exiting the crusher is important for the proper operation of the VSI.
2. VSIs should be properly sized for the amount of material feed. A small VSI will not de-cluster the frac sand completely, leaving sand in clusters. On the other hand, a large VSI will shatter the sand, damaging the sand particle shape. The correct size of a VSI should be determined by working closely with the VSI equipment supplier and running sample tests.



3. Most of the waste sand is normally dumped at the end of the crushing plant. The addition of a closed circuit at the end of the crushing plant to convey this waste product to a properly sized VSI can de-cluster additional sand grains and increase the product yield. This VSI works together with a screen to separate the final product.
4. The proper type of dry screens for final sizing sand grains is very important. High-angle screens are not recommended due to their inefficiency to screen 40+ mesh. Considerable good product can be wasted by the improper selection of screens in the dry plant. Low-angle screens with a gyratory reciprocating motion are more efficient in screening 40+ mesh particles.
5. The wet plant can be improved by additional attrition scrubbers in series if issues with acid solubility are present. This will contribute to further breaking up clusters of sand grains.



Producers may not realize how much product is being wasted by poor equipment selection. A particle size distribution test on the waste material is a good indicator of how much good product is being wasted.

The main contributor to this article was Pompeyo D. Ríos, Senior Mechanical Consultant, at PEC Consulting Group, St. Louis, Missouri.