The Vortecone: A New Maintenance Free Wet Scrubber Device

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ABSTRACT

Dust creates health and safety issues in mining and there are several different ways to reduce the amount of respirable dust created. Dust particles also affect the operation and efficiency of mining equipment. Flooded-bed scrubber systems are installed and in use on most continuous miners globally and are designed to capture dust particles close to the cutting head. The fibrous screens in the flooded-bed dust scrubber clog easily reducing their effectiveness and must be cleaned after every cut. A Vortecone is a wet scrubber system designed to capture paint particles (i.e. 1 to 300 microns) in the air for the automotive industry. The automotive design of the Vortecone had two outlets and a large pressure drop across the system with excellent cleaning efficiency. The complicated Vortecone shape was reimagined for the flooded-bed scrubbers using parametric analysis to reduce the pressure drop and increase flow rate capabilities. Using CFD analysis and laboratory testing, the redesigned Vortecone has been proven to have a lower resistance and higher particle cleaning from the airstream than the original design as well as the convention screens. This maintenance free wet scrubber device requires much less maintenance than a conventional screen and can be used continually without interrupting production. It requires some redesign of the scrubber system, but may not require the use of a demister. This paper presents test results of the redesign as well as how the Vortecone could be installed on existing machines by mounting it on the continuous miner model in our experimental mine.