

**Evaluation of Hydraulic Separator Applications
In The Coal and Mineral Industries**

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ABSTRACT

The mineral processing industry has commonly utilized hydraulic separators throughout history for classification and gravity concentration of various minerals. More commonly referred to as hindered-bed or fluidized-bed separators, these units make use of differential particle settling rates to segregate particles according to shape, size, and/or density. As with any equipment, there are inefficiencies associated with its operation, which prompted an industry driven research program to further evaluate two novel high-efficiency hindered bed separators. These units, which are commercially called the CrossFlow separator and HydroFloat separator, have the potential to improve performance (separation efficiency and throughput) and reduce operating costs (power consumption, water and reagent usage).

This thesis describes the results of recent laboratory and pilot-scale tests conducted with the CrossFlow and HydroFloat separators at several locations in the minerals and coal industries. Details of the testing programs (equipment setup, shakedown testing and detailed testing) associated with four coal plants and two phosphate plants are summarized in this work. In most of these applications, the high-efficiency units proved to provide a higher quality product at reduced costs when compared against the performance of conventional separators.

As a result of this test work performed in this study, a full-scale CrossFlow separator is being installed at an industrial site. The separator is an integral part of an ultra-fine phosphate recovery system at a Florida processing plant. The unit will be used to classify the +400 mesh material prior to column flotation. The successful implementation of the ultra-fine phosphate recovery system will increase industry profits by the millions of dollars in addition to reducing tailing impoundments and energy requirements.

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