

Recalling the Vertical Carbon Kiln to Duty

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ABSTRACT

The vertical carbon kiln developed by Combustion Air Pty Ltd over 30 years ago was independently tested and proven to be capable of reactivating carbon to greater than 90% of the activity of fresh carbon, provided feed moisture was within design specifications and salt levels in the process water were not too high. The vertical kiln was physically small and simple to operate. However, the gold industry needed increased carbon throughput and the Combustion Air design could not be scaled up.

Today, rotary kilns are used almost exclusively to reactivate activated carbon in the gold industry. Rotary kilns can reactivate carbon to over 90% that of fresh, but they often do not. Lack of understanding by metallurgist, poor operation and poor maintenance all effect a rotary kiln's performance leading to poor reactivation, poor utilisation, short equipment life and ultimately, gold losses.

The authors have exhaustively investigated rotary carbon kilns and reported how to optimise their operation. Despite this wealth of knowledge, the rotary kiln is not considered the ideal kiln for carbon reactivation. It is unnecessarily large, expensive and problematic to operate and maintain.

A variant of the vertical kiln is believed to be ideal. The science is known, it is just a matter of properly engineering the kiln. It can be engineered: for any carbon throughput; to cope with high moisture content carbon, to be physically small, to have minimal moving parts (just pumps, fans and a vibrating screen), to be easy to maintain, to require essentially no operator attention, and ... to just work.

This paper presents how to overcome the heat transfer issues that lead to the failure of the larger throughput Combustion Air vertical kilns, the development of the next generation of vertical kiln, and the testing of a large-throughput prototype vertical kiln.