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## The Ultimate Flotation Test

TUNRA Clean Coal (TCC) is an innovative research and design company working with coal preparation plants to maximise the yield from their fine coal processing circuits.

TCC is now expanding its flotation testing facilities to cater to the increasing demand from industry for specialised flotation testing of bore core samples (<500µm sized fraction) and full plant audits around the flotation circuit.

As part of this work TCC has had to develop new flotation test work standards as it was found that the current Australian Standard (AS 4156.2.2 – 1998 Part 2.2: Higher rank coal – Froth flotation – Sequential procedure) was dramatically underestimating the potential yield from fine coal flotation, especially thickener underflow samples. It was found in one case that the AS method gave a mass yield of 35 (% d) at an ash of 20 (% d), whereas the Ultimate Flotation Test (UFT) developed by TCC gave a mass yield of 60 (% d) at an ash of 7 (% d).

During the development of the UFT, an investigation was undertaken into the different methods being used in laboratories across Australia. It was found that there were over 100 methods being used that conformed to AS 4156.2.2-1998.

The UFT was presented in a paper at the 12<sup>th</sup> Australian Coal Preparation Conference (N. Lambert, M. Campbell, K. McLennan and A. Coffey “An Improved Laboratory Flotation Method” in Mathewson, DJ. (Ed) Proceedings of the Twelfth Australian Coal Preparation Conference, pp 396-408) and this method has since been further refined.

The UFT has been developed to give the closest flotation response curve to the theoretical flotation response curve possible. TCC have developed a method to produce a partition curve for a piece of flotation equipment. A UFT is performed on the feed, product and tails from the flotation circuit and the test results are then able to be used to generate a partition curve, which will make the flotation test analogous to the float sink test.

TUNRA Clean Coal has also developed standard laboratory flotation methods for the Jameson flotation cell for samples as small as 100 g and samples up to 200 kg.

In addition, TCC has developed a range of new flotation cells that are being trialled against existing flotation cells in plant and in lab conditions.

TCC is now offering these flotation test services to metallurgical and geological consulting companies as well as directly to the Coal Handling and Preparation Plants (CHPPs) to make sure that the potential of a coal resource is fully understood and that CHPP's are recovering the maximum yield from their fine coal processing circuit as well as gaining a further understanding of the fine coal flotation circuit.

Figure 1 is an example flotation report from a Ultimate Flotation Test compared to the results of a common sequential tree flotation test method used by laboratories in Australia. (Note, the graph refers to the “Common Sequential Tree Flotation Test” as our earlier work found over 100 different methods claiming to conform to the AS and all labeled as the Australian Standard Sequential Flotation (Tree) Test on subsequent lab results.)

Flotation test results are used in plant design and simulations, so relying on poor flotation test data can cause you to dramatically underestimate the true plant yield and result in good coal being lost to tailings.

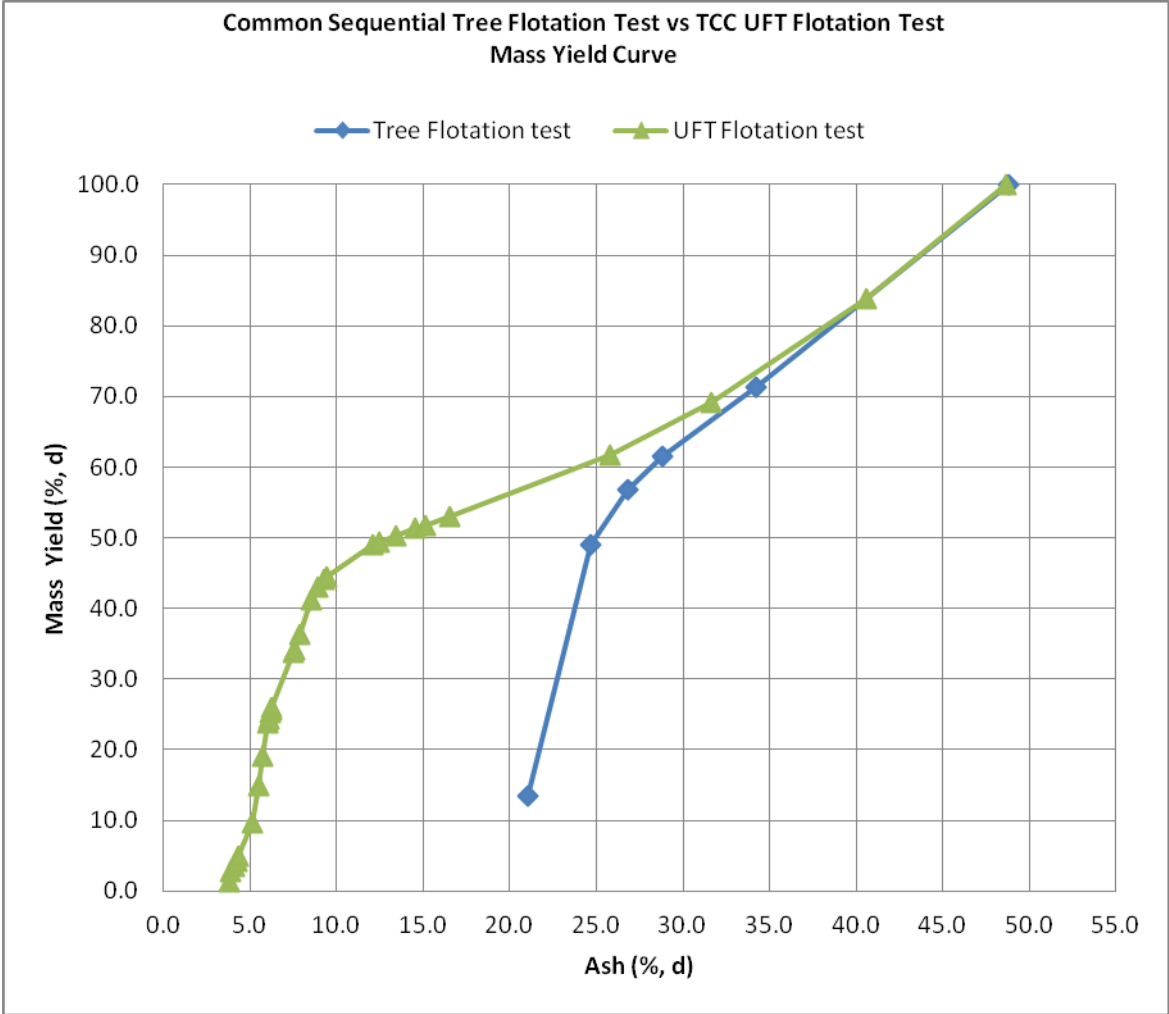


Figure 1. Comparison of Common Sequential Tree flotation test vs TCC Ultimate Flotation Test

The graph clearly demonstrates the difference in the mass yield curves produced by the two tests from the same sample.

The results from the sequential test show that there is little or no valuable material in the thickener underflow, suggesting that the plant is operating well.

The results from the TCC UFT , however, show a very different picture, demonstrating that there is a substantial amount of recoverable coal exiting the plant in the tailings stream, with a 50 % yield at an ash of 13.4% achievable from the tailings stream alone.

The UFT data can then be used by the plant to examine their systems and operation and make changes to recover this coal. By recovering this coal, you would also reduce the amount of solids leaving the plant in tailings by half, leading to less tailings dam requirements and reduced thickener operating costs.

TCC invites you to look at the methods your company currently uses to evaluate the flotation performance of bore core samples and plant flotation operations, to see if you are achieving the maximum yield from your resource.

For a comprehensive list of flotation testing available at the TCC flotation test facilities, or for further information on the flotation tests available, please contact TCC or Newcastle Innovation. Find out how the UFT can maximise your investment and increase your production.

Regards

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