Density Tracers for Coal
(low RD range) applications

COAL RFID Density Tracers

For density partition curves

Compliant with
Australian Standard AS5213: 2019
ISO Standard ISO5146:2022

- disposable tracers only for use with CurvePRO
- real-time automated monitoring, by a single operator
- 51 precise densities at 8mm, 13mm and 32mm

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COAL RFID Density Tracers

These single-use radio-identified density tracers are available to clients who have leased the CurvePRO System for dense medium cyclones and other density separators in coal-washing applications.

RDs	Tolerance
1.26, 1.28	100% ±0.006
1.30, 1.31, 1.32 … 1.59, 1.60	100% ±0.006
1.62, 1.64, 1.66, 1.68, 1.70	100% ±0.011
1.72, 1.74, 1.76, 1.78, 1.80	100% ±0.011
1.82, 1.84, 1.86, 1.88, 1.90	100% ±0.011
1.95, 2.00, 2.10	100% ±0.011

Each RFID tracer is in the form of a grey cube and contains a radio transponder capable of transmitting the density of that particular tracer to Partition Enterprises detection equipment, which is available for long-term lease to coal producers.

Density tracers with densities spanning the range of interest are added to the circuit feed and are automatically detected in the product and rejects streams (AS5213:2019 and ISO5146:2022). These tracers are disposable and therefore require no retrieval. For statistical confidence, at least 30 tracers are used for each selected density. Partition numbers are automatically calculated and the partition curve is plotted and displayed. The form of the curve can indicate whether the metallurgist should take actions such as adjust medium density, replace a worn circuit component, or correct an overload or medium instability situation. If a snapshot (short duration) audit is required, the entire process can be conducted by a single operator over less than 10 minutes, with the precise partition curve immediately displayed.

Interpretation of DMC Partition Curves

These figures illustrate the common forms of density tracer partition curves for dense medium cyclones treating coal. A module of one or more well-operated and well maintained dense medium cyclones should show an efficient separation (Figure 1). By contrast with conventional float/sink techniques, density tracers provide the resolution which shows that large particles can be partitioned with an Ep of less than 0.01 RD units.

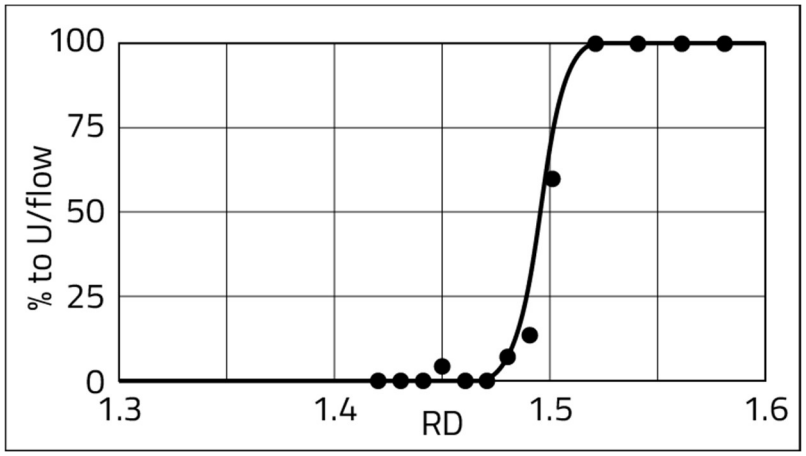

Fig. 1 Normal (efficient) Partition Curve

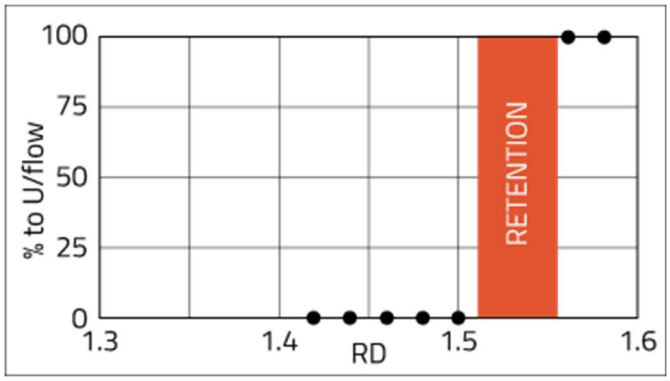

Fig. 2 Particle Retention

A small-to-moderate range of retention shows efficient partitioning, but there is a danger that a small change in operating conditions may increase the density range of retention. The cyclones then may rapidly become choked with "near-density" material and frequently clear themselves by ejecting surges of slurry, including low-density coal, to underflow (Fig. 3). Retention is rare for particles (coal or tracers) smaller than about 20mm.

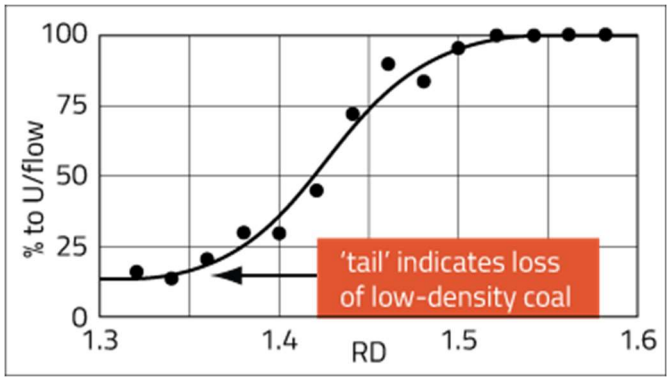

Fig. 3 Surging or Vortex Finder Overload

A large Ep, a low-density 'tail' and a low (sometimes negative) offset between feed medium density and cutpoint may arise from surging (see above) or from vortex finder overload when the medium flow from the vortex finder is insufficient to carry out all the particles which should report to the low-density product. As with surging, the yield loss can be very significant.

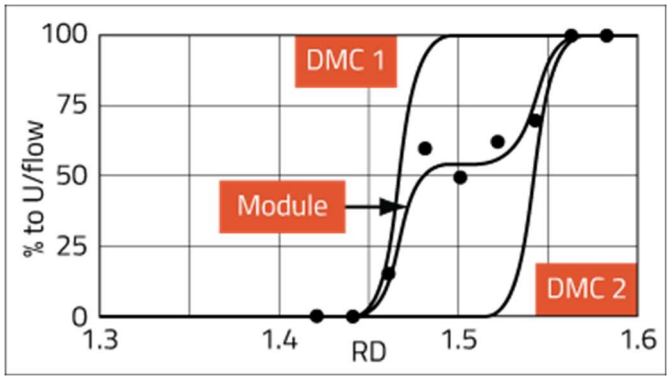

Fig. 4 Separators with Differing Cut Points

A partition curve with a plateau is indicative of differing cutpoints between separators operating in parallel. Examination of the data for individual product screens may suggest which units are separating at high, and which at low cut point.

Means for the correction of these separating inefficiencies may be found in the references listed or by contacting Partition Enterprises Pty Ltd.

References

Davis, JJ, Wood, CJ and Lyman, GJ, 1985a, "Density Tracers Can Improve Coal Preparation Plant Yield", Australian Coal Miner, July, pp9-1 1.

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Wood CJ, Davis, JJ and Lyman, GJ, 1987, "Towards a Medium Behavior Based Model for Coal-Washing Dense Medium Cyclones", Aus IMM Dense Medium Operators' Conference, Brisbane, 1987, pp247-256 and Coal Preparation, 1989, Vol 7, ppl83-197.

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