



ACARP matters because  
**the Reflux Classifier™ improves recovery of fines**

Traditionally coal preparation plants in Australia have had issues with the processing of fine coal. Typical dense medium cyclone (DMC)/spirals thermal plants have discarded tailings fines less than 150 microns. Coking coal plants with only DMC and flotation have lost yield of the higher size fractions reporting to the flotation plant. Coking coal plants with spirals have run with low DMC and high fines cut point and have lost yield because their circuits have operated at different incremental ash. Plants with simultaneous thermal and coking coal produced using spirals for fines treatment have frequently allocated fine coking coal to the thermal product.

A new gravity separation technology was therefore needed to address these ongoing issues.

### **Industry target**

- Reduce losses to tailings
- Maximise yield
- Maximise the coking coal: thermal coal ratio in two-stage plants.

### **Industry investment**

- ACARP: \$3.2 million over 10 years; Australian Research Council Linkage and Discovery Projects: \$2.3 million; plus company funding for on-site trials
- 15 projects over 10 years.





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## Results

- Commercialisation of the Reflux Classifier™, which consists of a set of parallel inclined channels mounted above a conventional fluidised bed (manufactured by Ludowici Australia, now FLSmidth).
- When installed, Reflux Classifiers have met all of the industry targets listed above.
- Plant trials have shown that Reflux Classifiers achieve a higher yield at the same ash as spirals.
- Ability to retreat tailings.
- Development of a range of unit sizes, from two metres to three metres diameter, and feed capacities up to 200 tonnes-per-hour.
- A full-scale trial is being conducted at Bloomfield Collieries in NSW to test larger feed size, up to four millimetres. If successful the load to the dense medium cyclones and the capacity of the desliming screens (which has been the limiting factor in coal preparation plants) could be increased. This work has the potential to increase plant throughput for a given capital expenditure and may deliver higher yield.
- The Reflux Classifier platform has led to new ACARP funded research on radical technologies in enhanced ultrafine gravity separation (the Graviton) and on the Reflux Flotation Cell. Both are being trialled at pilot scale, and are expected to progress to full scale.

## Return on investment

- Increased revenue due to:
  - Increased amount of useable coal
  - Increased tonnes of coking coal product (relocated from thermal coal product)
  - Increased plant yield
  - Lower ash at the same yield in fine coal
- The first unit, installed in 2004, continues to operate to this day.
- ACARP research led to a new breakthrough, with the re-launch of the technology in 2009, incorporating the new laminar shear mechanism.
- A project to retreat tailings at an Australian mine in 2010 initially increased the overall plant yield by six per cent, equivalent to around \$100 million a year in the short term, settling to around \$30 million a year over the longer term. This benefit was achieved from just one unit.
- Industry confidence in the new technology is reflected in the recent installation of more than 17 units in the Bowen Basin, replacing existing spirals technology.
- The Reflux Classifier is emerging as the industry standard in fine gravity separation.