

Dry separation using a gas-solid fluidized bed for waste treatment and mineral processing

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Separation is one of indispensable unit operations for manufacturing processes. Generally, wet separations using large amounts of water, such as dense medium separation and flotation, are utilized for waste treatment and mineral processing. However, these wet separations have disadvantages; waste water treatment is necessary, water leakage from separators is an issue of working conditions, and the control and adjustment of the density of the dense medium is expensive. Especially, the lack of water is becoming a critical issue in the areas with drought due to global warming, such as in China and Australia. Therefore, recent research has focused on the development of dry separations to replace commonly used wet separations.

The present author's research group designed and developed dry continuous separators using a gas-solid fluidized bed. It is well known that a gas-solid fluidized bed has liquid-like properties such as density and viscosity. When an object is placed onto the top of the fluidized bed, the object floats or sinks in the fluidized bed. The float-sink was applied to the dry separation. Continuous separators have been put to practical use for separation of waste plastics and waste nonferrous metals in Japan (Figure 1). Also, mineral processing for iron ore and coal was demonstrated to be feasible using the dry separator, and separation efficiency corresponding to that by the conventional wet separation was obtained by the dry separator.

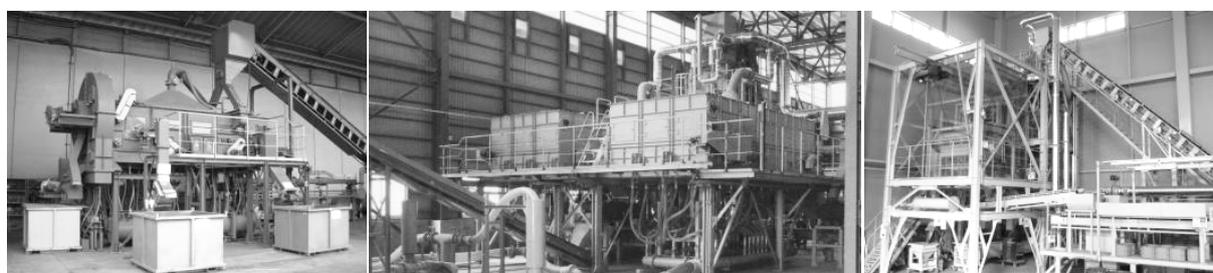


Figure 1 The commercialized dry continuous separators for waste treatment.