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## Removal of magnetic fine particles from non-magnetic fine powder by high gradient magnetic separation under dry condition

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Removal of magnetic fine particles from a non-magnetic fine powder by high gradient magnetic separation under dry condition was studied. The dry magnetic separation has been partially put to practical use in the separation of iron from waste, the mining field, the food industry and so on. However, in the application of high-gradient magnetic separation (HGMS) with a stronger magnetic force, there is a troublesome problem of clogging of the magnetic filter due to aggregation and deposition of non-magnetic fine powder. In this research, we have developed a new magnetic filtering system in which magnetic thin wires arranged in one direction with regular intervals were layered perpendicularly to the magnetic field direction. This makes it possible to reliably capture the magnetic fine particles while avoiding the filter clogging due to the powder. The capture rate of the proposed magnetic filter was investigated by a magnetic separation experiment and a three-dimensional FEM particle trajectory simulation. The magnetic wire size, spacing, and number of layers were changed, and the capture rate was investigated. As a result, by reducing the magnetic wire size and spacing and increasing the number of layers, the capture rate was improved without blockage of the filter, and its effectiveness was clarified.

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