

CONSTRUCTION OF A ROTOR TYPE MAGNETIC FILTER TO REMOVE METAL PARTICLES IN POWDER TYPE MATERIALS

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It is difficult to avoid ferrous / non-ferrous particles which are mixed up (contaminants) during the processing in food industry, for example spicy powders. Hence metal detectors are placed at the end of the production stage to ensure that all the metal particles are removed from the system. Thus, in most industrial processes, great care is taken to remove any unwanted ferrous contamination as thoroughly as possible. The developed magnetic filter is a technological contribution towards the above issue. This magnetic filter comprises a rotating cylindrical drum that contains magnetic array, extending 180° around the surface. Contaminated material to be treated is fed to the top of the rotating drum by a conveyor belt and allows to fall through the surface of the rotating drum. Ferrous particles are attracted to the magnet unit and hold to the drum until it rotates to the point where the magnetic field ends. At that point, ferrous particles are thrown away itself from the surface of the drum by centrifugal action imparted to it by its rotation. The purified material and contaminants are collected separately to the two trays, which have been installed beneath the two sides of the drum. A Magnetic rotor which rotates at high speed consists of rare earth magnets arranged in alternating polarity has been added to the filter which uses eddy current principle. It can separate non-ferrous conductive particles. It generates a repulsion force, which ejects the conducting particle from the stream of mixed materials. This force in combination with the conveyer belt speed provides an effective separation.

During the performance testing of the filter, it was noted that samples, which are contaminated with tiny ferrous particles up to 50% of its weight can be reduced to 8.53% by first cycle of filtering using this magnetic separator. If it is retreated as the second cycle, contamination percentage can be reduced to 1.75%. This filter can be used for filtering materials that are dry and free flowing or in the form of fluids and to process high volume of input material at a time with an automatic self-cleaning mechanism.

Keywords: Ferrous particles, Magnetic filter, Metal detectors, Non-ferrous particles