SIMULATION OF FLUIDIZED BED DRYER FOR COPPER CONCENTRATE THROUGH CFD + DEM.

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Abstract:

The fluidized bed drying equipment has the function of drying the copper concentrate containing 8 to 10% moisture, to leave it with a humidity less than 0.2%. The process consists in the transfer of heat, through the fluidization air, which is a mixture of combustion gases plus fresh air, this is transferred through a bed of gravel. The flow is extracted by a fan by dragging the dry concentrate, which is separated from the stream by a dust collector located outside the equipment. The equipment studied is part of a copper smelter in Chile and has a processing capacity of 123 t / h of dry concentrate, this dry concentrate is able to enter the copper converter to be melted and continue with the process until reaching to be metallic copper.

A computational fluid dynamic simulation (CFD) of the equipment was performed, which allowed us to see the behavior of the fluidization air through the pressure profiles, velocity vectors. Then a coupling of the CFD simulation was carried out with a discrete element modeling program (DEM) to study the behavior of the concentrate particles interacting with the fluid dynamics condition.

The results obtained from the simulations are presented in the form of figures showing the velocity vectors and the orientation of the flows reached both by the fluid and by the particles of the concentrate.

The validation of the results was carried out indirectly comparing the results of the sensors located inside the equipment on an industrial scale with the results observed in the simulation. The variation between the simulated model and the measured operational condition shows differences less than 1.7% for the parameter measured.

Conclusion

The study of a fluidized bed dryer is a highly complex process, however, making simplifications, and applying numerical methods using computational tools such as Ansys Fluent or Rocky DEM, it is possible to know the internal behavior of the flows with acceptable margins of error for engineering equipment design.