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Development of Refinement Control Systems with Additional Informational Loops

The main purpose of a single a group of concentrating machines, or a whole ore-dressing plant is to provide a constant ash value of coal. There were a number of different attempts to create reliable and high-quality systems of automatic ash value maintenance. However, none of them had a positive result.

The main reasons of failure are: a significant distance-velocity lag, time delay in the main control channels, and a wide range of frequency disturbances. Due to these factors until now, the staff of gravity separation department runs this technically complicated process on the basis of their own experience, which is not only inefficient but also uneconomic.

The currently offered system of control for gravity separation equipment contains the system of ash value maintenance. However the existing realizations of these systems do not meet technological requirements are in fact physically nonrealizable. Therefore, there still exists the problem of insufficient efficiency of gravity separation control due to the lack of physically realizable system of ash value maintenance at the gutter of the saddling machine at the output of gravity separation department or the whole ore-dressing plant.

That is why there is a task to increase the efficiency of gravity separation control by improving and developing new systems of gravity separation control, and by finding new sources of information to characterize the efficiency of the department performance.

As a result of a research conducted at a coal-dressing plant we could construct rational systems of automated ash content maintenance. The research was done on the basis of spectral analysis of the main disturbances at the input stage and their transformations by separate machines, departments and the whole plant. It was found that a significant effect can be obtained by introducing an additional informational signal about the energy input to centrifugal dryer into the system of automatic ash content maintenance. This significantly increases the operating speed and decreases ash dispersion. However, a more efficient method is to use bed height in the middling room of a saddling machine. This systems uses an additional information signal about the energy input of centrifugal dryer engines processing coal after the saddling machine.

The given structure and principle of construction of automated system of gravity separation control can be used in project and research institutes in the course of developing systems of gravity separation processes.