

## **Annotation**

To significantly improve the technical and economic performance of the dry two-stage grinding process, working according to the traditional scheme, the following issues have been successfully solved:

- created a new device that controls the loading of the mills on the dimensional sound method (special part 1);
- developed a two-link SAR of dimensional loading with compensation for the harmful effects of circuits on each other through a cross-technological communication channel. At the same time, the two-connected ATS technologically split into two Autonomous parts (special part 2);
- powerful perturbation of the circulating load from the control action of the second circuit on the loading mode of the first chamber is eliminated by the creation of a combined SAR control loop of the first chamber of the mill. This achieved a significant increase in the performance of the first circuit. Methods of the invariance theory (special part 3) are used for the synthesis of such a regulator-compensator);
- for the implementation of the new innovative technology of two-stage grinding with breakthrough indicators, a strength sensor of the ore crushed in the mill is required. This is a complicated scientific-technical problem is successfully solved by the use of probability theory (to determine correlation) and propose a variant of the technical implementation of the developed sensor-based wattmeter with active power telemetrically transmission of readings (spec.part 4);
- on the basis of the new strength sensor of the crushed material, a new innovative technology has been created that allows to create the most optimal grinding mode for the mill, depending on the strength of the ore. Strong ore – crushing blow creating waterfall mode by increasing the speed of the mill and Vice versa (special.part 5).

Thus, on the basis of the creation of new technological devices (discussed above), a large scientific and technical problem has been solved to significantly improve the technical and economic indicators of the process, dry two-stage grinding of minerals.