

Intelligent mining characteristics and technical path of fully mechanized mining

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ABSTRACT

The intelligent mining in China is still in the initial stage and its technical system is still being improved. Through analyzing the technical characteristics of production information acquisition, processing and control technology in different coal mining stages in China, it is believed that information perception, analysis and control technology are the essential features of the progress of coal mining methods. The connotation of intelligent mining in the fully mechanized mining was clarified to use the "interconnected" intelligent set of fully mechanized mining equipment as the carrier, based on the deep integration of modern technologies such as Internet of things technology, artificial intelligence technology, big data technology, cloud computing technology, and communication technology with coal mine production. The automatic coal mining technology with artificial intelligence features was realized to apply the intelligent information perception, intelligent information analysis and decision-making, intelligent control and feedback. The key of intelligent mining lied in accurate information perception, rapid decision analysis, precise coordinated control, and real-time feedback learning. The technical path to realize the intelligent mining included three aspects: intelligent perception of production physical scenes and big mine data storage, association analysis and intelligent decision-making of big mine data, and precise coordinated control of intelligent production equipment. These key technologies constituted the intelligent mining, such as accurate geological detection technology throughout the mining life cycle, precise perception technology for production scenarios, multi-source information fusion technology, intelligent decision-making technology under complex production environments, and reliability enhancement technology for fully mechanized mining equipment systems. Combining with the actual engineering, the preliminary application of the intelligent fully mechanized caving mining mode for extra-thick coal seams was introduced based on "man-machine-environment" multi-source information data.