Intelligent coal mining technology status and thought in China

Wang Guofa [1], Pang Yihui [2] and Ren Huaiwei [3]

1.Academician of Chinese Academy of Engineering, Coal Mining Branch, China Coal Research Institute, Beijing 100013. Email:wangguofa@tdkcsj.com
2.Associate research fellow, Coal Mining Branch, China Coal Research Institute, Beijing 100013. Email:pangyihui@tdkcsj.com
3.Researcher, Coal Mining Branch, China Coal Research Institute, Beijing 100013. Email:renhuaiwei@tdkcsj.com

ABSTRACT (USE 'HEADING 1' STYLE)

Four intelligent mining modes suitable for thin and medium-thick, thick, extra-thick and complicated conditions coal seam were developed based on the resources occurrence conditions and development requirements in China, and the scientific idea that coal mine intellectualization is the core technology support for high-quality development of China's coal industry was put forward. Through developing large expansion-ratio adaptive hydraulic support, intelligent low-body shearer, intelligent frequency conversion control scraper conveyor and other sets of technology and equipment for thin and medium-thick coal seam, the intelligent unmanned mining in thin and medium-thick coal seam was achieved, and the annual output reached 10 million tons in 3-4m coal seam condition. The adaptive control system of hydraulic support and surrounding rock and the supporting quality monitoring device for surrounding rock were developed based on the coupling mechanism of hydraulic support and surrounding rock, and a series of hydraulic support and sets of equipment for 6-8m mining height were developed, which achieved automatic inspection and high-efficient mining with less worker, and the annual output has exceeded 15 million tons in only single working face. The hydraulic support for fully mechanized caving working face with two pillar and the strong disturbance coal institutions with intelligent control were developed for 8-25m extra-thick coal seam, and the automatic top-coal caving control system was developed based on sequential control logic and the coal and gangue identification device. The maximum cutting height is 7.0m, the fully mining coal seam thickness is 25m, and the annual output exceeded 12 million tons in the fully mechanized caving face with large mining height. The stability control principle of self-supporting, neighbor-pulling, bottom-pushing and top-squeezing in hydraulic support was proposed for large dip angle coal seam, and the mechanical mining and local intelligent mining equipment were developed, which achieved the safety and efficient mining of working face with a maximum inclination angel of 55°.