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The relevance of using a pre-tensioning of cable bolts used to reinforce an arch yielding support

Abstract

Widespread, in Polish hard coal mining, string bolts are used to reinforce the arch yielding support of roadways. The article attempts to prove that change in approach to long bolting technology can bring significant benefits in terms of improving the stability of roadways also limiting the development of the fracturing zone in the roof, and ultimately also increasing the frame spacing of arch yielding support. The article contains the results of numerical calculations using the finite element method showing the effect of pre-tensioning on the work of string bolts installed in a situation when a zone of a fractured rock mass appeared above the roadway, which is observed above the arch yielding support. As a result of the calculations, the dependence of the final vertical displacements of the roadways roof on different pre-tensioning variants of the cable bolts was presented. In the second part of the article practical aspects of the use of cable bolts with pre-tensioning in reinforcing the rock mass and arch yielding support of roadways were presented. In addition, the directions of changes in bolting technology, which aim is to achieve an increase in work safety and reduce the costs of arch yielding support were determined.