

IMPROVEMENT OF MINE WORKINGS DRIVEN IN STRUCTURALLY DISTURBED ROCKS

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ABSTRACT: On the basis of the practical data obtained from underground mine which were driven in massive rock with high structural disturbances and low strength; a new technological method of blasting and backfilling of the goaf behind supports was developed. This method offers higher backfilling quality, backfilling bonding by binding agents and in mis way decrease of inelastic deformations of rocks, ensures more even pressure in supports for increase of their stability.

When driving underground workings in massive with structural rock disturbances and low strength and where supports setting are provided immediately from working face, increased attention is given to backfilling of goaf behind supports. Our investigations showed that when using existing technology with mainly hand-placement of rubble rock material, it is impossible to keep required standards of backfilling, and this causes pressure distribution on supports to be irregular and mere are rubble rock material falls. Moreover, the process is extremely labour-consuming and low productive. Experimental investigations were carried out in mine conditions for evaluation of loading level of steel timber sets by a method with the use of pressure transducers, which showed that low quality backfilling is the cause of irregular supports loading. Phased measurements showed up considerable difference in sets loading which was up to 100 percent and more, some sets were not undei loading and some sets were overloaded. It is a cause of untimely destruction of some sets and pressure redistribution, which gives rise to loading increase to other sets, and they begin to deform and break down. Practice of deposit exploitation shows mat development workings and access roads can not survive stresses during their life without retimbering and this procedure is labour consuming, unsafe and requires additional working expenses, besides that technological regime of actual mining is disturbed

Taking this into account we worked out the method of blasting backfilling with the use of quick-setting

mixtures. Both methods with blasting energy use for backfilling and binding agents are used in mining practice. Known technical procedures have some defects which we tried to eliminate by our method development.

This method allows to decrease inelastic deformations in adjacent rock massive and in the whole increase supports stability. Characteristic property of this method is unification of blasting backfilling of a goaf behind supports and blasted rock injection of quick-setting mixtures in common technological process

Substance of üiis method is in the following (Figure 1).

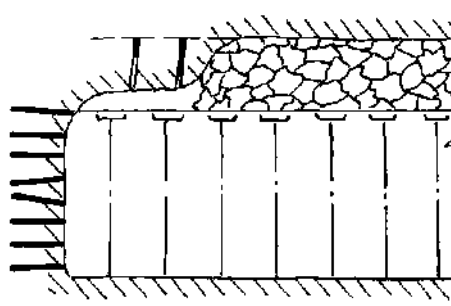


Fig. 1

When driving mine working, frame support is installed with set lagging immediately adjacent to working face. Then, it is necessary to drill holes

of main and additional rows into nearly placed massive through clearances between laggings. Holes of additional row are drilled with displacement each hole relative to hole of main row on half of its step. After that laggings are located by installation of struts between rock massive and laggings over timber sets. Subsequently necessary quantity of containers with binding agent are placed in holes of main and additional rows, main row holes are charged by explosive and all holes are tamped. Diameter of additional row holes is such that all hole volume may contain necessary quantity of containers with enough quantity of quick-setting mixture for one cycle of breaking and injection of rocks to the direction of a goaf behind supports.

Blasting of main row holes is carried out at the same time with driving (outside) holes with one stage of delay. In the moment of explosive blasting in holes of main row, surplus pressure arises and breaks down the containers with binary mixture containing main component and hardener placed in them. As a result of blasting, aforementioned components are mixed and fill rock fissures. Main rock mass of binding agent enter a goaf behind supports from additional holes where containers break down after explosive blasting too. Quick-setting mixture use increases strength of enclosing rocks, decreases dynamic effect of blasts on backfilling layer and zone of inelastic deformations development..

The use of additional holes row decreases burden of main holes row and in that way decreases explosive consumption, looseness of rocks in massive near workings contours increases, quality of backfilling of a goaf behind supports increases and as a result serviceability of supports increases

The method of blasting backfilling which was worked out by us decreases expenses for supports setting and roadway maintenance, increases labour safety and improves ecological conditions of underground mining operations. We received the patent of Kazakhstan patent department for this method

CONCLUSIONS

On the basis of analytical investigations and practice, data analysis of conditions of horizontal

mining workings driven in difficult mining conditions, a new technical method of blast-injection backfilling of the space behind support was worked out. This increases backfilling quality, improves a backfilling process and ensures more even pressure distribution on support and it renders good stability during exploitation.