

POLITECHNIKA ŚLĄSKA

WYDZIAŁ GÓRNICZWA I GEOLOGII



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OCENA WPŁYWU CZYNNIKÓW KONSTRUKCYJNYCH I EKSPLOATACYJNYCH NA PODPORNOŚĆ SEKCJI OBUDOWY ZMECHANIZOWANEJ

ROZPRAWA DOKTORSKA

Promotor:

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Summary of doctoral thesis

ASSESSMENT OF A SHIELD DESIGN AND OPERATIONAL FACTORS IMPACT ON THE YIELD LOAD OF POWERED-ROOF-SUPPORT UNITS

Appropriate selection of powered-roof-support units for specific geological and mining conditions ensures both the safety of the mining crew and efficiency of coal extraction process in a longwall mining system. Therefore it is of crucial importance to assure the correct interaction of shields and a rock mass.

To satisfy this critical condition the research analysis is needed to find out the influence of both shields design factors (like the geometry of cylinders of hydraulic jacks which determines the support stiffness) and operational factors (like setting load and loading of the canopy shield) on yield load of a support unit.

To complete the above mentioned task it was necessary (among others) to:

- create a model of a shield and rock mass interaction assuming that the induced stress (load) resulting from roof caving process is transferred by the support itself, the coal seam and the blocks of rocks in a gob area (the blocks which are arranged both in a regular and irregular, chaotic manner).
- carry out the measurements of both hydraulic fluid pressure changes of main hydraulic jacks of shields and the inclination of canopy, base plate and canopy shields of units installed in a longwall.

The analysis of the influence of several factors on the yield load of powered-roof-support units was within the scope of the thesis.

The main factors which were taken into consideration in the analysis were:

- the impact of convergence of a longwall working,
- the impact of canopy shield loading,
- the effect of geometrical features of cylinders of hydraulic jacks,
- the impact of setting load.

As a result of the studies a method of analysis of equilibrium conditions of a roof strata in the vicinity of a longwall was proposed. The method can be used as a design tool which allows the determination of powered-roof-support units properties which will keep the convergence of longwall working at the acceptable levels and thus will ensure suitable roof stability conditions.

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