**METHOD FOR ESTABLISHING INDENTATION ROLLING RESISTANCE
OF THE BELT ON IDLERS**

**Abstract of doctoral thesis**

**MSc. Eng. Martyna Konieczna-Fuławka**

**Advisor: Prof. Lech Gładysiewicz**

**Secondary Advisor: Dr. Dariusz Woźniak**

Belt conveyors are vital elements of transportation systems in underground and surface mines. The maintenance of belt conveyors generates significant costs due to consumption of electricity. Nowadays, the design of belt conveyors focuses on searching for energy-saving solutions. For this, theoretical methods including the relevant structural parameters of the conveyor, operating parameters and belt parameters are necessary. Expanding this knowledge requires increasingly precise tests and theoretical analyses. The reduction of energy consumption is possible by reduction of indentation rolling resistances, which are the main component of motion resistances for conveyor longer than 80 m. Previous research indicates underestimation of the resistance calculation results in relation to the measured values, especially at high mass conveyor capacities.

During the implementation of this work, the tests of rolling resistance of conveyor belts and parameters such as damping factor and modulus of elasticity were made. The research aimed to develop a new method of acquiring in laboratory conditions parameters such as damping or stiffness. This parameters were applied into theoretical model in way which reflects the phenomena accompanying the operation of the belt under operating conditions. The proposed theoretical model differs from other models known from the literature in the new approach to parameters that take into account the visco-elastic properties of belt (damping factor and modulus of elasticity), taking into account uneven load distribution along
pitch-surface generator of idler and new equation for equivalent transverse stiffness of the based on uneven distribution of stresses in the core of the belt.

The improved method for establishing indentation rolling resistance of the belt has reduced the error of estimating the resistance to movement for maximum conveyor efficiency from 54.8% to 8.0%. Including randomly variable stream of bulk material the average error of estimation of motion resistance for the entire conveyor efficiency range for the calculation method previously used was 45.0%, for the new method an error of 9.8% was obtained.