

**POLITECHNIKA ŚLĄSKA**

**WYDZIAŁ GÓRNICCTWA I GEOLOGII  
INSTYTUT MECHANIZACJI GÓRNICCTWA**

**ROZPRAWA DOKTORSKA**

**IDENTYFIKACJA SPRZEŻENIA  
CIERNEGO MIĘDZY NOSIWEM I TAŚMĄ  
W PRZENOŚNIKACH NACHYLONYCH**

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## **IDENTIFICATION OF THE FRICTIONAL CONTACT BETWEEN BULK SOLIDS AND BELT IN INCLINED CONVEYORS**

The frictional contact between the bulk solids and the conveyor belt is one of the basic factors which are important to ensure safe and reliable operation during starting, stopping and fixed speed operation of belt conveyors transporting bulk solids slope up or down. Identification of the frictional contact between the belt and the transported material is an important research issue for the proper design of industrial conveying systems due to such factors as: increased requirements for conveyor slope, speed and capacity, and because of the shortcomings of existing theoretical and experimental studies. In order to achieve the objective of this work, the following research activities have been carried out:

- development of a new experimental method and apparatus for measuring the coefficients of static and kinetic friction between a specified bulk solids and the conveyor belt of various structure and surface characteristics,
- conducting a series of experimental studies to determine the relationship between the external static and kinetic friction and influencing factors such as the type of coal, the weight of the bulk solids sample, granulation of the bulk solids sample, total moisture of the bulk solids sample, the type of the new conveyor belt, the surface condition of the conveyor belt (surface roughness), and the slope of the conveyor belt.

The tester was designed and built while keeping in mind that tribological phenomena are influenced by various factors; these factors should be varied widely and independently, yet they should also be measured easily. The method of testing is based on the principle of operation of an inclined plane and their originality lies in the wide use of mechatronic digital sensors.

The proposed experimental test method for determining the coefficients of friction is the basis for calculating the permissible inclination angles of belt conveyors for specific transport conditions taking into account parameters such as the type of bulk solids, the type of conveyor belt, belt speed and acceleration during starting and stopping of the conveyor.