

ABSTRACT

The determination of the impact of dynamic loads on the mechanical properties of steel ropes.

Steel ropes are one of the most essential elements of every type of lifting and hoisting equipment utilized for horizontal and vertical transport. The primary function of ropes in this equipment is the transfer of axial loads; more rarely it pertains to transverse loads.

Ropes are widely used in such industries as extraction, especially in deep mining. In mineshaft equipment they represent one of the most important parts of their elements. The effectiveness and safety of the entire mining production process is dependent, in large part, on the efficacious and reliable functioning of ropes. This relation directly translates as well to the safety of individuals who utilize and operate this machinery.

Among the many exploitation factors determining the wear of ropes, one of very significant importance is the way they are load burdened. The variability of operating conditions, as well as not always clear predictability of the effects of the environment, mean that ropes are subject to variable loads during their exploitation. Particularly dangerous in this regard are dynamic loads. The brief period of their duration, with often very high short-term levels, bring on changes in the mechanical properties of ropes. This, in turn, can translate into their accelerated wear or damage. Thus, this phenomenon is profoundly dangerous and, as yet, not well diagnosed.

The subject of this research study pertains to this issue. The dissertation presents an original method of examining the impact of dynamic loads on the properties of mechanical ropes. Based on this method were conducted studies of a wide range of rope parameters subjected to the stress of loads of freely-falling masses. Based on the obtained results was determined the actual impact of the dynamic loads on the parameters of the ropes in the study.

The developed study methods, conducted studies as well as the obtained results unequivocally convey that dynamic loads have a very significant impact on the properties of mechanical ropes. This specific method of burdening ropes, which occurs frequently in their actual use, can lead to significant deterioration of their properties, and in further stages can result in the damage or ruination of the ropes.

Guidelines have been developed regarding exploitation, assessment and control of the technical state of ropes subjected to dynamic loads with the goal of achieving practical application of the results of the conducted studies. The results of these studies along with conclusions flowing from them are contained in the work.

The dissertation of the presented methods of studies together with their results, as well as the conducted analyses and developed conclusions should represent a valuable source of knowledge in the realm of assessment and exploitation of steel ropes in extraction/mining industry. It is worth underlining the universality of the presented solutions, which provides the opportunity to implement the results of the study correspondingly in other industries.