

Katowice, 29.11.2018r.

mgr inż. Sławomir Baranowski

Faculty of Transport

Silesian University of Technology

ABSTRACT

dissertation titled The influence of effect of the sectional satellite wheels on course of load in meshing of the planetary gear

Development of modern mechanical systems used in the industry causes to increase requirements for drive systems of working machines, which are particularly vulnerable to extreme operational impact resulting from changing loads during operation.

Drive systems of these machines are one of the key links in the process of their use. The drive systems an important role in the transfer of power (torque) from the engine to the executive body of the working machine perform various types of mechanical transmissions.

Today, the most common group of transmissions are gears, and this is increasingly planetary gears. This is due to their relatively high mechanical efficiency. Moreover, the application of planetary gears allows you to build drive systems are characterized by much smaller dimensions, which is essential in the case of machines working in coal mines.

Adoption and implementation of a research topic in the context of the present dissertation is justified in the field of cognitive load on planetary gears with a clear focus on utilitarian goal, which is to design and development of advanced propulsion systems working machines with improved durability, used in particular in the mining industry. The implementation of the research may be needed to enrich the knowledge base in the design process of modern machines drive systems.

In principle, the cognitive main objective of the experimental work was carried out to identify the comparative effect of the split narrow planet gears, and thus the width of the load distribution of the length of the teeth of the planet gears of the central wheel of the planetary gear. Achieving this aim, in addition to in-depth analysis, requires experimental research on a specially-built test stand and simulation tests on a solid model of the transmission using the finite element method (FEA).

To achieve the objectives of the doctoral dissertation are required partial tasks, namely:

- analysis of the advisability of research topic in the light of current knowledge,
- construction of a special, innovative test stand and a solid simulation model, designed to study the impact of the partition and width of the planetary wheels on the load on the gear teeth of planetary gears,
- elaboration of the methodology of experimental and simulation research (identification) of the influence of partition and width of the planetary wheels on the loads of gears,
- conducting experimental research on a built-in test stand and simulation on a virtual solid model,
- analysis of results obtained in experimental research,

- analysis of the results of simulation with the use of MES,
- development of final conclusions and summaries.

Adopted the scope and aims of this dissertation tend to formulate the following doctoral thesis: **The width of the gears, in particular in planetary gears, has an adverse effect on the load distribution along the tooth line. Significant improvement of the load distribution in meshing of planetary gears with the central wheel of the planetary gear is influenced by the structural solution consisting in replacing the standard planetary wheels with an equivalent system of wheels partition perpendicular to their axis of rotation.**

The obtained new results in the scope of influence of internal factors on gear load, which was the main objective of experimental and theoretical research of this dissertation, indicate to constructors directions of actions that can minimize loads affecting machine drive systems, and in the case of planetary gears - load reduction directions in gears by improving the degree of suffering and reducing the uneven loading of teeth along their length. This knowledge should be helpful in the phase of constructing and operating gear transmissions in order to meet the growing requirements.