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APPLICATION OF HYDROMECHANICAL AND ELECTROMECHANICAL TRANSMISSION IN BELAZ

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Our country is one of the world's largest exporters of mining dump trucks called Belaz. Since these machines are quite heavy, they must be equipped with a transmission that ensures traffic safety and facilitates the operation of the dump truck.

It should be said that the transmission of a car is a set of aggregates and mechanisms of a car that transfer the engine torque to the drive wheels and change the torque and speed in magnitude and direction [1]. A hydromechanical or electromechanical transmission is used at Belaz. The hydromechanical transmission is used to change the traction force on the driving wheels of the dump truck depending on road conditions, to facilitate vehicle control and safety, to reverse, disconnect the engine from the transmission when it starts and the engine is running when the dump truck stops, as well as to ensure the operation of the dump truck's hydraulic systems. The hydromechanical transmission is a single unit consisting of a matching transmission, a torque converter, a four-shaft gearbox with friction clutches, a hydrodynamic retarder brake and hydraulic system components. All its units are mounted in a common detachable housing consisting of the crankcases (housings) of these units. To the hydromechanical transmission, the torque from the engine is transmitted through a gimbal transmission. The hydromechanical transmission is used in Belaz trucks with a lifting capacity of up to 90 tons [2, p. 32–33].

It should be noted that the obvious advantages of using a hydromechanical transmission are easier driving by using only 2 pedals, ensuring safety due to the reduction of the control unit compared to a manual transmission, increased cross-country ability due to flexible speed control of the machine, the presence of a beneficial effect on durability of

the engine and other vehicle components in the hydromechanical transmission [3].

An electromechanical transmission system is also used at Belaz. An electromechanical transmission (hereinafter referred to as “EMT”) is a type of power transmission in which the torque from an internal combustion engine is transmitted to the wheels or tracks through an electrical system. Optimal traction and dynamic characteristics combined with the characteristics of an ideal theoretical continuously variable transmission. No gear shifting required. Smooth change in the speed of the dump truck. Minimum operating costs with high productivity of transportation work. Programmable controllers began to be used as a computer system. Which made it possible to automate transmission control processes.

It is very obvious that the EMT has the following benefits: increased deceleration efficiency without wear on mechanical parts, which reduced the cost of consumables; increase reliability by reducing mechanical components; easy to operate compared to the hydromechanical transmission; automation of settings and easy troubleshooting. EMTs are installed on Belaz trucks with a lifting capacity of over 90 tons. The EMT is allowed to operate in the extreme conditions from +55 to –60 °C, in quarries with high dust content and difficult road conditions [4, p. 21].

In conclusion, it should be pointed out that both the hydromechanical transmission and electromechanical transmission have their advantages, in today's world where everything is based on the desire to reduce the cost of consumables, EMT has the advantage of reducing the cost of operation.

References

1. Transmission // Academic. – URL: https://dic.academic.ru/dic.nsf/ruwiki/91627 (date of access: 28.03.2025).

2. Reginya, V.V. Hydromechanical transmissions of Belaz mining dump trucks with a mechatronic control system / V. V. Reginya // Mining industry. – 2017. – № 3 (133). – P. 32–36.

3. Advantages of cars with hydromechanical transmissions // Automatic Transmission Group. – URL: https://www.at-g.ru/articles/preimushchestva-akpp (date of access: 30.03.2025).

4. Kazubenko, A. F. Use of electromechanical transmission on Belaz mining dump trucks / A. F. Kazubenko // Mining industry. – 2018. – № 6 (142). – P. 21–23.