

## **TRENDS OF DEVELOPMENT POWER PLANTS WHEEL TRACTORS**

**Danylenko V., Kozhushko A.**

*National Technical University*

*«Kharkiv Polytechnic Institute», Kharkiv*

Modern trends in the introduction of new designs of units and aggregates of power plants of any technology are aimed at satisfying the indicators of machine productivity and environmental friendliness. Agricultural machines are no exception, which, in addition to traction (technological) work, often perform transport work. Therefore, the operation of the power plant of the wheeled tractor must be "adaptive" to changes in the traction and speed conditions of operation, while complying with the requirements for productivity and environmental friendliness.

According to the principle of torque transformation, stepless and stepless transmissions are distinguished, which are divided into mechanical, hydraulic, and electric according to the principle of operation. Tractor manufacturers are also implementing alternative solutions when building power units: hybrid (hydro-volumetric-mechanical (HVMT) and electromechanical transmissions) or switch to another power source. Among the mechanical transmissions of wheeled tractors, transmissions that switch gears under full load (PowerShift) or under partial load (Semi-PowerShift) dominate. An additional unit (Power Shuttle) is also being introduced for the possibility of switching the direction of movement of the wheeled tractor, that is, when moving forward, the operator-driver can pull the lever and stop the tractor and move back at the same speed. On the basis of PowerShift, the introduction of transmissions with a double clutch is also known (Double Clutch Transmission).

The most developed and widespread hybrid power plants are hydraulic-mechanical transmissions. According to their structural structure, hydraulic-mechanical transmissions are distinguished by the principle of placement of the planetary mechanism (adder of hydraulic and mechanical branches): "differential at the input", "differential at the output" and a mixed structure, which provides for the presence of differentials, both at the input and at the output of the transmission. The use of hydraulic-volumetric-mechanical transmissions is generally observed on models of wheeled tractors with high power (from 150 to 400 hp). This trend is explained by the greater expediency of their use on tractors when performing traction work due to the fast, stepless and smooth selection of the necessary gear ratio of the transmission.

There is also a noticeable trend of electrification of agricultural machinery based on the hybrid concept with the help of integrated system solutions, which is due to the reduction of emissions into the external environment. Concept solutions were offered by companies such as Steyr with the Hybrid Drivetrain Konzept innovation, Zahnrad Fabrik with the eTERRAMATIC transmission, John Deere with the eAutoPowr transmission and others. This concept is based on the structure of classic PowerShift mechanical transmissions and the replacement of hydraulic branches with electric ones.