

**Секция 1 «СОВРЕМЕННЫЕ ТЕХНОЛОГИИ И ТЕХНИКА  
В РАСТЕНИЕВОДСТВЕ»**

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**THE MAIN DIRECTIONS OF DEVELOPMENT OF  
TECHNOLOGIES AND EQUIPMENT IN DEVELOPED  
COUNTRIES**

K.A. Kashpor – 41 AI student, TF

Supervisor:

c.t.s. N.I. Boltianska

*Melitopol State University, Melitopol*

Evaluation and determination of the prospects of new mobile energy facilities (MEF), developed and recommended for agricultural production, must be carried out in accordance with the industry-accepted methodology for assessing their technical level. It should be noted the main directions of development of technology and technology in developed countries. The results of the research show that the change in the technical and operational indicators of tractors (operating time and fuel consumption) takes place abruptly: first, on average, the productivity of units with caterpillar tractors decreases by 6% per year and by 5% with wheels. Fuel costs increase by 1-2% per year. Moreover, such a change is observed during the first 4 years, that is, until the first major overhaul. Then, after a major overhaul, the indicators improve to values close to those of the second year of operation and again decrease at the same rate by the 8th year of operation, that is, until the second major overhaul. After the repair, the indicators again improve to close to nominal values (with a decrease of 5 percent) and then change at the same pace [1,2]. As a rule, the third overhaul is not carried out and after 10 years of operation the tractor is written off. However, there are many cases when tractors are repaired after the 12th year of operation (that is, they perform the third major overhaul), then a jump in the change in indicators is observed again.

The achieved level of energy supply and power supply, provision of the necessary equipment, fertilizers, plant protection products in developed countries allows them to switch their attention to the qualitative side of these indicators: a) improving the structure of energy capacities by increasing the capacities of MEF; b) optimization of the composition of the

MEF (the ratio of tractors and agricultural machines is 1:3, and in our region – 1:2); c) renewal of the fleet based on new generations of MEF, where the latest achievements in microelectronics, robotics, laser and microwave technology are used; d) creation of MEF not only for individual technologies, but also for certain types of farms (large specialized, diversified, small farms, etc.).

Technological progress in agricultural production primarily depends on energy resources. The agricultural mobile power vehicle is basically a four-wheel drive vehicle, which is equipped with oversized tires that do little damage to the soil. The cabin is an automated "command post" not only for control, but also for control [2,3]. The mobile power tool is equipped with an economical engine, front and rear linkage with a quick hitch, a multi-range gearbox with automatic gear shifting without interrupting the power flow, providing speeds from transport up to 95 m/h and working speed up to 40 km/h. Engine power ranges from 10 to 400 hp. The MEF design is being improved. For comparison: tractors with a capacity of 30, 60, 135 and 160 hp are produced in the region, which will be the base of the MEF. While development is underway for 55...70 and 200...220 hp. In developed countries, there is still a relentless increase in the capacity of MEF. Since 1980, their average power in France has risen from 49 to 62 kW, and in England from 78 to 90 kW. And this trend is noticeable all over the world and even where the main agricultural producer is a farmer. The most popular power range in the West is 65-100 hp. A noticeable decrease in specific fuel consumption – up to 145 g/(hp-h) and oil for waste – up to 0.2...0.3% of the fuel. For comparison: domestic engines spend 175...184 g/(ehp-h).

The main ways to achieve the following indicators:

- improvement of combustion chambers, bringing the injection pressure up to 100 MPa, the introduction of nozzles with 5...7 holes;
- the use of advanced turbochargers with intercooling of air, which in general gives a 1,5-fold increase in engine power;
- improvement of the thermal regime of engines due to automatic shutdown of the fan;
- use of plastics and other new materials and technologies;
- a significant increase in the reliability of the MEF – for some companies, the motor resource reaches 12...15 thousand engine hours and the time between failures is up to 1000 hours with a two-year warranty period, that is, 5000 engine hours.

New foreign MEF are markedly improved in environmental terms by improving the processes of fuel combustion, the use of catalysts, reducing pressure on the soil and sealing. Helical gears are used in power transmissions. Tractors and combines are equipped with hydraulic transmission, and the working bodies of agricultural machines are equipped with hydraulic drive. The most common working pressure is 20...22 MPa. The carrying capacity of hydraulic hitching devices has been increased to 7...8,6 tons. Almost all MEF are produced with a front drive axle. The carrying capacity of the front attachments already reaches 6 tons, however, this is less than the rear ones. Oil-cooled disc brakes are widely used, which contributes to a sharp increase in their durability. Modern foreign MEF are equipped with computers. All leading tractor-building companies are working on the creation of multifunctional on-board computers.

MEF designs are increasingly using new materials: plastics (fuel tanks, wheel wings, individual lining elements), ceramics (engine exhaust ducts), polyamide seals, composites, as well as new finishing and decoration technologies. Ceramic linings are being introduced in one disc, asbestos-free linings of brake discs, friction clutches, etc.

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