JOURNAL OF APPLIED SCIENCE AND SOCIAL SCIENCE
eISSN 2229-3113 pISSN 2229-3205

Volume 15 Issue 08, August 2025
Impact factor: 2019: 4.679 2020: 5.015 2021: 5.436, 2022: 5.242, 2023: 6.995, 2024 7.75

CONSTRUCTIONS OF HANGING MECHANISMS OF EXISTING UNIVERSAL ELECTRICAL EQUIPMENT, WORK QUALITY INDICATORS

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Annotation: This article analyzes the designs of existing UAV (universal electrical devices) suspension mechanisms and their performance indicators. Methods of operation, strength, durability, and efficiency of suspension mechanisms of various designs are considered. Comparative analysis is carried out based on performance indicators, including accuracy, speed, and reliability. The adaptability of the mechanisms to operating conditions and the ease of maintenance are also assessed. The results indicate the possibility of constructive improvement to ensure the effective and long-term operation of modern UEVs.
Keywords: UEV, suspension, design, work quality, efficiency, maintenance

Introduction. The layout of units is carried out on the basis of traditional and non-traditional layout solutions. Construction of technological units based on traditional layout solutions is not always optimal and cost-effective, as their annual load is low and metal consumption is high.

Therefore, the construction of units using non-traditional layout solutions was considered in more detail [1].

In world agricultural engineering, there is a tendency to develop a block-modular principle for constructing technological units.

Such units are highly adaptable to modern forms and technologies of agricultural production and are especially relevant for commodity producers with limited material and labor resources. According to the materials of the last All-Russian Agricultural Congress [2], more than 30% of the harvesting machinery fleet in the Russian agro-industrial complex operates in such conditions.

Aggregates can be created in two ways. In the first case - on the basis of combining the released mechanisms with one of the interchangeable functional modules - adapters. Such formation of aggregates is currently widespread in the agro-industrial complex [3].

The second method is the creation of a system of mobile technological means (adapter modules) interchangeable on the chassis with an alternative adaptive unit with a single-chain power system. This is a fundamentally new way of constructing technological units [4].

Currently, universal mobile energy means (MES) have been developed for assembly of the agro-industrial complex with mounted and trailed adapter modules (agricultural machinery, grain and fodder harvesters and complexes).

The energy saturation of such a MEV, increased transmission on the running gear, increased load-bearing capacity of the hydraulic mounted mechanism (HMO), advanced HMO systems and electronics and information technologies were widely used in the aggregate replaceable modules of the working bodies [5].

When aggregating mechanisms with replaceable adapters, traditional techniques (methods) of connecting machine constructions and their combination are used by [6]:

- connection of adapters to the MEV trailer;
- adapters mounted on MEV inserts;

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- Installation of the adapter on the MEV chassis.

Connection of MEV units with adapters is carried out by installing trailers and attachments installed on the MEV chassis, as well as by installing (replacing) adapters on the MEV chassis or installing them using autonomous loading devices.

The most promising design and assembly solutions have been implemented in modern MEV samples:

- Gomselmash Plant (Belarus) - UES-250/280; UES-290/450 "Polesye" universal energy means (UEV);
- UEVs of the "Claas" company (Germany) belonging to the Cherion family (Trac, TracVC, SaddleTrac).

The UES-250/280 (1) power system is equipped with a semi-frame chassis (Fig. 1.12 a), a control cabin (2), a front suspension system (3), and a rear trailer. UES-290/450 (1) is distinguished by the presence of an additional rear suspension system (4) (Fig. 1.12 b). The load capacity of GOMs is slightly increased.

However, the overall load capacity of the suspension systems and the UEV chassis are still insufficient to accommodate adapters with significant mass, for example, a combine harvester. Therefore, a special grain harvesting complex KZR-10 (12) "Polesye - Rotor" with a block-modular structure on the UEV (Fig. 1.12 b) was developed. UEV, protected by patent No. 2146083 of the Russian Federation, developed on the basis of the original design and structure [7].

In addition, the UEV can be equipped with sets of interchangeable adapter modules. The main technological disadvantages of the "Poles'ye" UEV are the insufficient load-bearing capacity of its hinged systems and chassis and the inability to install technological or transport adapters on the chassis.

The Cherion MEV family is equipped with a power transmission based on a frame-structured chassis (Figure 1.3.1), a control cabin (2), and front (3) and rear (4) hinged systems.

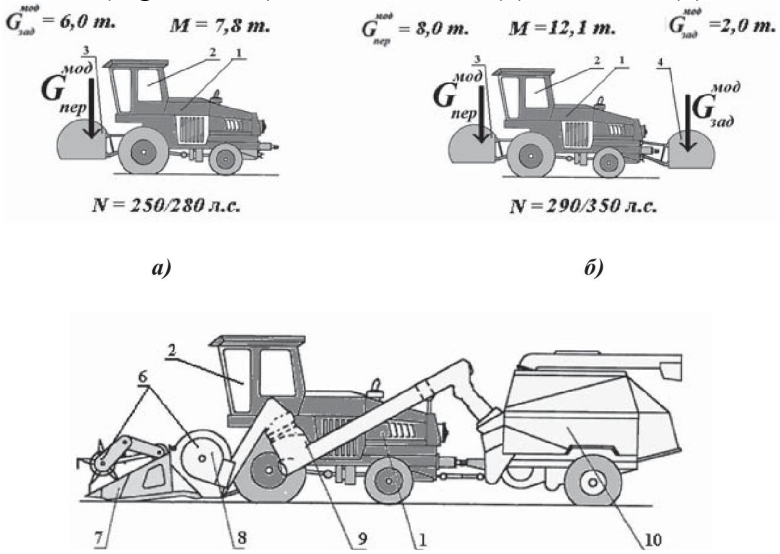

Figure 1. Aggregation of the manufactured UEV "Polesye" (PO "Gomselmash") with technological and harvesting adapters: a - UES-250/280; b - UES-290/450; c - grain harvesting complex KZR-10 (12) based on UES-290/450 "POLESIE-ROTOR"; 1 - UEV: 2 -

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control cabin, 3 and 4 - front and rear adapters; 6 - assembly module; 7 - cleaning part; 8 - hopper; 9 - grain heap transportation system; 10 - grain cleaning and gathering adapter.

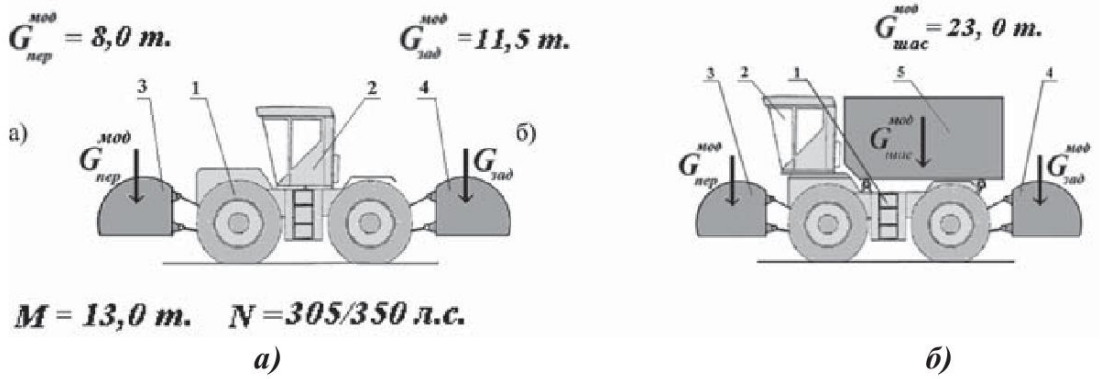

Fig. 2. Aggregation with the manufactured UEV (Claas company) technological and assembly adapters: a, b - MEV models Xerion Trac, Xerion Saddle Trac; 1 - MEV: 2 - control cabin, 3 and 4 - front and rear systems with adapters; Transport and Technology Adapter on Chassis 5

The cab is capable of rotating around its axis and changing its position. In the latest versions, replaceable technological adapter modules (5) in the form of a body or gear can be installed on the MEV chassis. Installation of the latter is carried out using additional autonomous loading devices.

In the future, in order to expand the capabilities of the Xerion MEV (10), to install a grain harvester (1) on its chassis, the company "Claas" developed and patented a procedure scheme for such units in Russia [5], which has not yet been implemented in practice (Fig. 2).

However, the technology for installing (or dismantling) a replaceable adapter on the shelves on the MEV chassis does not meet modern requirements, as it takes a long time. The Xerion MEV still lacks effective and reliable mechanisms and devices for replacing adapters that can be replaced over the chassis, which is its main disadvantage and reduces the efficiency of adapter replacement. In addition, the range of mechanized work performed by the MEV is very limited.

Significantly increasing the efficiency of the combined operation of variable adapter modules and the MEV, in our opinion, is possible by combining a part of the adapters by hanging and attaching traditional units to the MEV chassis and installing several or one process adapter on top of the MEV chassis using its own loading device to replace the adapters. Such a conceptual construction of aggregates is reflected in the patent of the Russian Federation No. 2431954, developed by the GNU SKNIIMESX of the Russian Agricultural Academy [6].

Conclusion.

As a result of the analysis of the existing designs of the suspension mechanisms of the UEV (universal electrical means) and their performance indicators, it was established that each type of design has its advantages and disadvantages. The strength, durability, and mechanical accuracy of suspension mechanisms are important factors in their effective operation. Quality indicators, such as accuracy and speed, determine how mechanisms work under different operating conditions. Also, the ease of maintenance and the possibility of adjustment of mechanisms serve to extend their service life.

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