

For example, in Germany, there is a network of independent organizations with over a century of history that deals with technical product inspection.

These are the technical inspection societies Technischer Überwachungsverein (TÜV) , which provide for the procedure for drawing up conclusions.

For example: a single permit, i.e. homologation according to § 21 Homologationen in the text “Regulations for the registration of vehicles for road traffic” Straßenverkehrs-Zulassungs-Ordnung (StVZO) (type examinations for approval for operation) for Europe, including for vehicles released for operation in the USA and Japan in accordance with Directives of the European Parliament 2007/46/EG, 2002/24/EG, 2003/37/EG and DIR 183/2011 (scope of activity of the Import and Export Services department (SIMEX)).

Also in Germany there is a procedure for registering tuning in accordance with § 19 Fahrzeugänderungen StVZO, dedicated to changes in the vehicle.

The TÜV certificate lists all changes made to the vehicle on TÜV approved components only.

This procedure provides for 30 types of design changes that require additional information to be included in the vehicle's registration documents – the vehicle's technical passport (Fahrzeugschein) – as well as 10 types that do not require such markings, in the case of the installation of easily removable equipment.

Ten conditions requiring supervision have also been formulated. For tuning enthusiasts, 23 types have been defined, along with procedures and required documents for registration. Technical inspections (mass inspections) in Germany are regulated by § 29 of the Reihenuntersuchungen StVZO [1].

International approval for the operation of wheeled vehicles is of the utmost importance in order to ensure maximum safety for all road users.

Reference

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ANALYSIS OF INDICATORS OF FUNCTIONAL STABILITY OF THE TRACTOR UNIT IN PLOWING MODE

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The development of agriculture worldwide requires improving the technical characteristics of agricultural tractors [1]. Thus, modern tractors must be able to perform a wide range of agricultural operations with a guaranteed level of reliability [2].

Thus, modern agriculture is developing in the direction of increasing the energy intensity of tractors, their productivity and at the same time reducing all types of costs (fuel, time, tamping and destruction of the soil structure) for performing agricultural operations. At the same time, great importance is attached to ensuring the functional stability of the tractor unit [3].

The most urgent issue of ensuring the functional stability of the tractor unit is for plowing, as one of the most energy-intensive operations [4].

And, even taking into account the further development of technologies without plowing, it is still too early to talk about the final abandonment of traditional plowing.

Functional stability is a property of a tractor unit, which consists in the ability to qualitatively perform the necessary work under the influence of external and internal destabilizing factors [5].

Ensuring functional stability is a complex problem that requires a systematic solution to a set of interrelated tasks for the development of theoretical provisions, methods of automated modeling and analysis of complex systems that allow building reliable models, setting requirements for functional stability and assessing their implementation [6]. The functional stability of a tractor unit is influenced by various factors, the most influential of which are: stability and stability of movement [7].

According to the theory of O.M. Lyapunov, a tractor unit has a stable dynamic equilibrium if external forces acting on it do not change the given direction of movement or do not take it out of the given deviation limits.

Stable movement of the tractor unit is possible if the moment of force forcing it to turn (M_v) is not greater than the moment of resistance to turning (M_s): $M_v \leq M_s$. The stability condition limits the plowing process and allows its oscillations within these limits.

Requirements for the stability of movement limit the oscillations of the process in terms of stability. These indicators, although interconnected, cannot replace each other.

Stability and stability of work increase with the improvement of the design of machines. The stability of the movement of the tractor unit is influenced by: the design of the machine and, to a greater extent, the design of the control mechanism; the type of drive of the engines; the terrain; the operator's qualification and reaction speed; the speed of movement; the width of the machine's grip; the weight of the tractor unit; the distribution of weight on the axles; the tractor base; the location of the tractor's center of gravity relative to the longitudinal axis of symmetry; the stiffness of the tires; the compactness of the soil.

First of all, the tractor's turning mechanism provides its stability both when turning and when moving forward. In addition, with different tractor turning mechanisms, the kinematics of its turning differ significantly [8].

In this case, the greatest difference is achieved by the difference in the kinematics of the passage of the rear wheels and their relationship with the front ones.

The wheels of the rear and front axles of the tractor travel different distances when turning, and for a tractor with front steered wheels, the difference between the distance traveled by the wheels of the front and rear axles is more significant. In addition, the tractor's exit from the turn also differs significantly. Thus, a tractor with an articulated frame will try to level itself through the operation of the central hinge (or a device that replaces it).

In this case, both the front and rear axles will be constantly leveled at once, which leads to the destruction of the stability of movement and a significant increase in the soil plane that the rear wheels compact when exiting the turn. In turn, a tractor with front steered wheels will be more confident in exiting a turn, since when the wheel steering angle decreases, the stability of movement will increase [9].

The type of drive of the engines has a significant impact on both the stability of the tractor unit and the load on the tractor elements. Studies [10] have proven that the optimal type of drive allows you to significantly increase the stability of movement and reduce the load on the transmission.

The terrain also has a very large impact on the stability of the tractor unit. It is known that at any given moment the terrain under each wheel of the tractor is different, which leads to a different length of the path traveled by each wheel. Because of this, the tractor always tries to lose the stability of the movement, which is supported in a certain range by the inter-wheel differential [11].

No less important influence on the stability of the tractor unit is the qualification and speed of the operator's reaction, because it is on it that both the duration of transient processes and their output to steady motion depend [12].

The stability of the tractor unit movement depends on the balance of forces acting on the working bodies and the ratio of the parameters of individual elements and parts of their attachment to the frame.

Due to the heterogeneity of the soil and the conditions of movement (soil density, microrelief, vegetation cover, physical and mechanical properties and other factors), the forces acting on the tractor unit change in magnitude and direction, their balance is disturbed and because of this the tractor unit in the vertical and horizontal directions begins to move with a deviation.

The width of the grip and the speed of movement of the tractor unit are limited not only by the traction capabilities, but also by the stability of its movement in a given direction. With a rigid connection of agricultural machines with a tractor, the stability of the tractor unit depends on the magnitude and

unevenness of the traction resistance of these machines, the moment of resistance of the tractor to turn and the scheme of their aggregation [13].

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