

The systems with two-stage supercharging and hybrid drive (with electric machine) have the greatest potential [2]. The latter solution looks the most interesting in terms of prospects for large-scale application in the near future.

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## THE INFLUENCE OF SILENT BLOCK CHARACTERISTICS ON THE FUNCTIONAL PROPERTIES OF AUTOMOTIVE SUSPENSIONS

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Bushings are among the most vulnerable parts of a vehicle. Designed to effectively absorb loads and reduce vibrations that occur during acceleration, braking, and cornering, they must withstand critical stresses.

They connect the suspension components to the vehicle body (frame). Bushings are the load-bearing elements that determine the suspension's performance, and they change their properties during operation under loads and external factors.

Silent blocks in a vehicle's suspension are special rubber-metal components. A bushing is an elastomeric cylinder installed between the outer and inner bushings. Bushings connected to suspension components transmit forces from the vehicle's wheel to the body or frame.

Bushings can be divided into two groups: torsional and compression. Elements that operate under compression and bending include cushions (bearings). And the elements that work on torsion are silent blocks, which are used in the suspension guide arms [1, 2].

A vehicle's suspension provides a flexible connection between the body and the wheels, reducing dynamic loads when driving on uneven roads and over obstacles [3, 4].

Suspensions differ in their design: the presence or absence of silent blocks. Silent blocks are used in virtually all types of suspensions, with the exception of heavy-duty vehicles equipped with a balance beam suspension. In passenger cars, independent suspension is widely used.

This type of suspension offers several advantages: low unsprung weight; high level of comfort; engine placement between the arches, which lowers the car's center of gravity; less wheel interference.

An independent suspension design includes elastic and damping elements and a guide vane. Currently, the most widely used independent suspensions are the following types (Fig. 1): 1. Swinging-rod (MacPherson) suspension; 2. Double-wishbone suspension; 3. Multi-link suspension.

The greatest influence of silent blocks on the elastic and damping characteristics is evident in double wishbone suspensions.

Silent blocks in such suspensions have a compression ratio of up to 500% [5, 6]. Therefore, the research presented in this paper aims to develop a quality control method for silent blocks in this type of suspension.

The following requirements are imposed on the vehicle's suspension during operation:

1. High reliability of its components;
2. Ease of maintenance and repair;
3. Ensuring a smooth ride and reducing vibration loads;
4. Ensuring kinematic and elastokinematic characteristics;
5. Ensuring ground clearance changes depending on the load on the vehicle's axles, within specified limits;
6. Ensuring vehicle stability and control.



Figure 1 – Types of independent vehicle suspensions: a – MacPherson suspension; b – double wishbone suspension; c – multi-link suspension

The functional properties of silent blocks influence all of the above suspension requirements.

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## **MODERNIZATION OF A SMALL-TONNAGE VESSEL CONSIDERING QUALITY, SAFETY, AND OPERATIONAL RELIABILITY REQUIREMENTS FOR VETERAN REHABILITATION**

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Currently, the problem of rehabilitation of war veterans is highly relevant for Ukrainian society, among whom there are many individuals who have received wounds, concussions, limb amputation, post-traumatic stress disorder, and other disorders in the psycho-emotional sphere.

According to the results of conducted research, thalasso-oriented recreation shows good results in the reintegration of combatants into civil society, along with various types of psychotherapy, animal therapy, and art therapy.

In recent years, the Department of "Shipbuilding and Ship Repair named after Prof. Yu.L. Vorobyov" of ONMU has been researching the possibility of using in the rehabilitation process a watercraft created on the basis of the Gloucester Gull, the design of which was developed in the second half of the last century by Philip C. Bolger.

The boat has a narrow and sharply pointed bottom near the extremities. At the midship, the design height of the side is approximately 30 cm, but it increases in the bow and stern extremities.

The relatively low freeboard is compensated by a significant flare of the sides and the sheer of the side line. Sufficient stability of the dory is ensured due to the fact that during a heel, thanks to the flare of the sides, the waterplane area increases and, accordingly, the restoring moment increases.

For use in projects for the rehabilitation of fighters, the following changes need to be made to the design: