

REDUCING THE WEIGHT OF AUTOMOBILE PRODUCTS BY REPLACING MATERIAL

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Annotation: *The automotive industry uses many materials to build automobiles, including iron, aluminum, steel, glass, rubber, petroleum products, copper, steel, and more. These materials have evolved over decades, becoming more sophisticated, better built, and safer. They have emerged over the years as new automotive manufacturing technologies have emerged and they are increasingly being used in innovative ways. This article provides information on the introduction and application of modern systematic materials in the automotive industry. Given local and foreign data sources, car manufacturers are constantly trying to create the lightest cars to increase speed and power. The research and development of lightweight materials will reduce their cost, increase their recycling capacity, ensure their integration into vehicles, and maximize their advantages in terms of fuel economy. There is light weight without losing power and speed properties, and the future is the automotive industry. It brings innovative materials to the forefront of design.*

Keywords: *steel, aluminum, aluminum alloys, aluminum matrix composites, polymer and composite materials, plastics, lightweight materials.*

Introduction.

The automotive industry is one of the largest consumers of building materials in the world. Improving the durability and reliability of the work of automotive parts is a topical and important problem of materials science. The development of the automotive industry, the increasing demands on the quality and safety of materials used require the creation and application of new forms. At the same time, the growing demand for resources is creating competition among manufacturers of different materials, leading to success in developing new types and improving their quality.

The automotive industry uses the latest innovative developments resulting from the development of science and new technologies. Among the main vectors of the modern automotive industry are:

– Creating a variety of smart cars that can work in difficult situations on the road without the involvement of the driver;

– Development of cars with alternative energy sources. Among them is the most well-known and successful Tesla car line.

The performance of the cars is constantly improving as the engines become more efficient, the body is more aerodynamic, the transmission is improved, and the tire resistance is reduced.

Reducing its mass is very important when creating a car. This allows the car to retain key features, using less powerful engines that use less fuel and emit less harmful substances into the

atmosphere. In addition, the inertia of the car is reduced and less energy is required to accelerate or break it. Reducing the weight of the car also reduces the load on the suspension parts, which increases their service life.

Use new, lighter, but more durable materials, which are usually more expensive due to the need to reduce the weight of the car, however, cars will be more complex and accordingly harder for objective reasons. New lightweight building materials need to be weighted, including new units, active and passive safety systems, to reduce toxicity and continuously improve comfort levels. Lightweight constructions are increasingly used in the automotive, aerospace and construction industries, as the use of low-density materials allows to reduce the structural weight of products.

This can lead to significant fuel savings and reduced carbon footprint in transportation, and makes it easier to manipulate details in home-building applications. In addition, low material densities lead to natural resource savings because less material is required to produce consumer goods.

More than half of the total production of modern automobiles consists of cast iron and steel parts (55%), about 11% - plastics, the third place - aluminum alloys (9%); rubber and glass - 7 and 3%, respectively; the proportion of non-ferrous alloys (magnesium, titanium, copper and zinc) does not exceed 1%; other materials (varnishes, paints, electrical wires, coating materials, etc.) account for 13.5%.

Traditionally steel or various metal alloys. Steel has high strength and reliability, but it is prone to corrosion, and the parts made of it are characterized by a much larger mass.

The first attempts to simplify car design were made in the 1940s. By using parts made of synthetic fibers. Insufficiently developed technology at that time did not allow to obtain high-strength material, so initially only decorative panels of the car body were made of synthetic fibers.

Thanks to the use of the latest advances in science today, polymer compounds exhibit much greater hardness and strength than conventional steel. Due to the interconnection of synthetic fibers, a strong reinforcing frame is formed, through which the load is distributed evenly over the entire surface of the part. In addition, carbon fiber parts weigh almost three times less than steel-like strength.

In the manufacture of elements of modern engines, composite-based materials with aluminum are widely used matrices. Their alloy is aluminum, in which silicon and carbon fibers are added, previously passed through a special matrix made of titanium or aluminum. Such technology allows you to increase the strength of the material for multiple stresses.

The use of polymeric materials can significantly reduce the cost of manufacturing auto parts. The matrix of details made of synthetic fibers requires additional processing and even coloring, leaving it completely ready for installation. It is not particularly difficult to make very complex shaped parts from synthetic materials, it is very difficult to do this with steel. Polymer materials have an almost unlimited service life. They do not corrode; The effect of significant loads and vibrations that can easily withstand. The strength and rigidity of the car body elements made of synthetics can significantly increase the reliability and safety of the fibers along with reducing the weight of the car. The only setback is the widespread use of carbon fiber in the automotive industry due to the very high cost of producing it. Part polymer synthetic fibers are 30-40 times more

expensive. However, the level of steel and light alloys inevitably leads to a decrease in value over time to improve carbon fiber technology.

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