

## **Lecture 2. Technical tools for transport and cargo systems.**

**Purpose of the lecture:** – classify transport and cargo complexes based on types of transport and characteristics of goods;

**Keywords:** technical equipment, subsystems, lifting transport vehicles, Hoisting machines

**Types of lectures :** Lecture-explanation.

### **2.1. Purpose and classification of technical equipment of transport systems**

### **2.2. Technical and operational parameters of lifting transport vehicles**

### **2.3. The reliability of hoisting machines**

### **2.1. Purpose and classification of technical equipment of transport systems**

The main subsystems of TGS are:

- transport (railways, roads, special roads, waterways, vehicles);
- freight (storage buildings, structures, hoisting-and-transport machinery and equipment).

Trucks and trailers are classified by load and body type. The rated carrying capacity of the car (trailer) determines the maximum permissible payload when the car is in various road conditions. Depending on the load capacity, trucks and trailers are usually divided into the following classes: particularly small load capacity (up to 0.5 t), small (from 0.5 to 2 t), medium (from 2 to 8 t), large (from 8 to 16 t) and large carrying capacity (over 16 t).

By the type of body, trucks and trailers are divided into automobiles and general purpose trailers (onboard) and specialized trailers (dump trucks, wagons, tanks). According to the principle of unloading, cars and dump trailers are divided into three main groups: with tipping bodies (cargo is dumped by tilting the body), with bunker unloading (cargo is dumped when the body is stationary on the inclined planes that make up the side or bottom of the body - a humped bottom, hopper), with forced ejection of cargo from the body (conveyor floor, augers).

The most common are cars - and dump trailers with tipping bodies, which can be classified depending on the direction and method of tipping. In the direction of tipping, there are dump trucks: with tipping the body only back (with rear unloading); with tipping the body on one side (with side unloading); tipping the body to any of the three sides; with preliminary lifting and tipping of the body back or to the side.

### **2.2. Technical and operational parameters of lifting transport vehicles**

Hoisting, transporting and loading and unloading machines are characterized by the following main parameters: carrying capacity, speed, lift height and range, cargo moment, boom or span, dead weight, dimensions, operating modes, technical and operational performance, reliability and durability indicators, loads on running wheels, etc.

The main technical characteristics and productivity of machines are taken into account when choosing mechanization schemes for reloading and transport operations based on appropriate production technology, ensuring operational safety, and economic feasibility.

The nominal (maximum) carrying capacity of a machine is the mass of cargo that the machine can lift.

Kinematic parameters - the speeds of various mechanisms: lifting and lowering, transportation, movement of the machine, rotation (rotation), tilt and rise of the boom, etc.

The main dimensions of the machines are length, width, height, reach of the boom, span, maximum height of raising and lowering the cargo below zero, ground clearance, track, base.

The most important comprehensive indicator of a material handling machine is its performance. Productivity of the machine is that amount of cargo that can be processed by it for a certain period of time and is expressed in t, m<sup>3</sup>, pcs. in hours, shift, month, year.

### **2.3. The reliability of hoisting machines**

Hoisting machines are one of the links in the technological chain of the transport and cargo complex. To ensure its smooth operation, all links must have a sufficient level of reliability.

In accordance with GOST 27.002-89, reliability is defined as the property of an object to keep in time, within established limits, the values of all parameters that characterize the ability to perform the required functions in the given modes and conditions of use, maintenance, repair, storage and transportation. Reliability is a complex property, which, depending on the purpose of the object and the conditions of its stay, may include failure-free operation, durability, maintainability and maintainability or a certain combination of these properties.

Reliability - the property of an object to continuously maintain a functioning state for some time or operating time.

Durability - the property of an object to maintain a healthy state with an established system of maintenance and repair. Maintainability - the property of the object, which consists in the ability to maintain and restore working condition through maintenance and repair.

Preservation - the property of an object to preserve, within specified limits, the values of parameters characterizing the ability of an object to perform the required functions, during and after storage and (or) transportation.

The most important reliability properties listed above characterize certain technical conditions of an object. There are five main types of technical condition of objects.

Good condition - the state of an object in which it meets all the requirements of regulatory, technical and design documentation.

A malfunctioning state is the state of an object in which it does not meet at least one of the requirements of normative-technical or design documentation.

A workable state is the state of an object in which the values of all parameters characterizing the ability to perform specified functions meet the requirements of normative-technical and design documentation.

Inoperative state - the state of an object in which the values of at least one parameter characterizing the ability to perform specified functions do not meet the requirements of normative-technical or design documentation. The limiting state is the state of an object in which its further operation is unacceptable or impractical, or the restoration of its operational state is impossible or impractical.

Literature and resources

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2. Boyko N.I., Cherednichenko S.P. Transport and cargo systems and warehouses: textbook / N.I. Boyko, S.P. Cherednichenko. - Rostov n / a.: Phoenix, 2007.-- 400 p.
3. Transport and cargo systems. Textbook / A.S. Balalaev, I.A. Baburova, A. Yu. Kostenko. - Khabarovsk: Publishing house of FVGUPS, 2015.-- 101 p.
4. 4. Complex mechanization and automation of loading and unloading operations: Textbook / Ed. Timoshina A.A. and Machulsky I.I.-M.: Route, 2013.- 400 p.

**Internet resources:**

1. Abdikerimov, G.S. Logistic management of cargo transportation and terminal and warehouse activities [Text]: A textbook for specialists / G.S. Abdikerimov, S.Yu. Eliseev, V.M. Nikolashin, A.S. Sinitsyna, O.B. Malikov // M: FGBOU "Educational-methodical / center for education in railway transport". - 2013.-- 428 p. <https://e.lanbook.com/reader/book/59016/#1>
2. Balalaev A.S., Leontiev R.G. Transport and logistics interaction in multimodal transportation: monograph. - M.: FGBOU "Educational-methodical center for education in railway transport", 2012. - 268 p. - <http://e.lanbook.com/view/book/58896/page58/>
3. Design of loading and unloading devices and warehouses: Method. instructions / compiled by V.A. Bolotin, E.K. Korovyakovsky, N.G. Yankovskaya.- SPb.: FSBEI HPE PGUPS, 2015.- 38 p.

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