THE SUPERIORITY OF A CYLINDRICAL GEAR MOTOR (WITH AN ELECTRIC MOTOR) USED AS AN ELECTRIC DRIVE OF MACHINE TOOLS AND TECHNICAL EQUIPMENT OVER THE USUAL

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Abstract: *The article contains a general concept of spur gearboxes and their improved types of spur gear motor, design features, characteristics and advantages.*

Key words: *Spur gear, gear motor, transmission, efficiency, torque, wheels, teeth.*

The transfer of torque between some elements of mechanisms has been of interest to designers for centuries. And the appearance of the internal combustion engine gave impetus to the creation of a cylindrical gearbox.

The word gearbox itself means “retracting”, “transmitting” back, which characterizes its main quality, the removal of rotational force.

This gearbox is called cylindrical not because it is cylindrical in shape, but because this unit has a cylindrical operation scheme, namely, cylindrical wheels are used in its design. Inside the gearbox, there are gear wheels and at least one cylindrical gear in several rows.

The transmission in cylindrical gearboxes can be direct, chain or gear.

Thus, a cylindrical gearbox is called a mechanical system assembled for the purpose of transmitting and converting torque force. The system is capable of converting a high angular velocity into a lower one with high efficiency with an increase in torque, i.e. an increase in the transmitted force. When an electric motor is added to the system, we get a cylindrical gear motor - a compact device that creates and converts torque.

Torque transmission in cylindrical gearboxes can occur in different planes and at different angular arrangements of the shafts relative to each other. Depending on the angle of inclination of the gear teeth, the devices under consideration are divided into spur gears and helical gears.

According to their names, spur gears have straight teeth; helical gears have helical teeth to transmit torque.

The location of the teeth relative to the axis of the gears is a rather important characteristic. But a more significant role is played by the design features of the gearbox in the transmission of torque. In addition to, in fact, spur gearboxes, consisting exclusively of spur gears or helical gears, the following are widely used:

Bevel-helical gearboxes. One of the most popular design options is a two-stage gearbox, but more stages are possible.

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Helical gearboxes combined with an electric motor, of the type combined with an electric motor, is called a helical gear motor. A cylindrical gear motor with parallel shafts allows you to optimally solve the problem of connecting the gearbox to the equipment and save the overall dimensions of the structure as a whole.

It is possible to use a cylindrical motor reducer, it is possible to transfer rotational motion between coaxial or parallel shafts and its transformation. The design of the equipment may have one, two or three steps. This factor allows you to increase the scale of variable power on the gross element. The efficiency in such mechanisms is high and can reach 98%, even at maximum power. Also, the advantages of cylindrical motor gearboxes include reliability and long service life. With proper operation and maximum loads, the service life reaches 20,000 hours.

An important role in ensuring the required characteristics is played by the distance between the axes of the gearbox. Alignment is when the distance between the input and output shafts is less than the distance between the center gears. The gear coaxial cylindrical has a right angle of summing up the shafts. The main advantage is the low load on the high-speed shaft, which can significantly increase the power and efficiency of the device. The disadvantage is the more complex design of the gearbox, especially the high-speed shaft.

Due to their high technical and operational characteristics, helical gearboxes are widely used in various fields of activity, especially in mechanical engineering and automotive industry. This type of device is used in various industrial equipment - cranes, mixers, machine tools, extruders, and more. other machines and mechanisms. A limitation for the use of devices is the need for a smooth running of machines and mechanisms, as well as small dimensions with a large gear ratio of steps.

Thus, the use in the production of a helical gear motor is appropriate. Since, by replacing a conventional cylindrical gearbox with a motor-reducer (with an electric motor), the reliability of starting parameters is significantly increased, and stable operation is ensured under various overloads, which in turn ensures an increase in production efficiency as a whole.

It would also be appropriate to say that this type of gearbox increases the service life of the equipment, preventing its rapid wear.

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