Restoration of Belt Pulleys

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ABSTRACT

This article describes the main work performed on the restoration and repair of emerging malfunctions of belt drive pulleys. Pulleys are the main parts of belt drives. Pulleys are used for the purpose of converting and transmitting torque over long distances

Keywords: pulley, belt, defects, friction force, driven and leading, wear, flat-wired, V-belt, poly-V-belt, round-belt. .

A belt pulley is a wheel with grooves or teeth around the circumference of the rim. Due to the frictional forces and mechanical engagement of the pulley and the belt, energy is transferred from the drive pulley to the driven pulley with a change in torque and rotational speed.

The shafts of remote power units are connected by a belt drive, as well as in cases where a silent, smooth transmission is required, and accurate positioning of the connected units is not required. This design consists of pulleys (driven and driven) and a belt covering them. The movement is transmitted by the frictional forces that appear when the belt is pulled over the contact area of the pulleys and the belt (V-belts and V-ribbed belts); for toothed - the movement is transmitted by engaging the teeth of the belt and pulley. This imposes certain requirements on the material of the belt and on the profile of the belt and pulleys.

General information. Belt drives are *friction transmissions with flexible coupling.* The transmission consists of pulleys: the leading one, located on the motor shaft, and the slave puller on the gearbox shaft (or actuator). Power and movement between the shafts is transmitted by means of a belt due to the presence of friction between the pulleys and the belt. The frictional force required to transmit torque is generated by the tension of the belt.

Classification of belt drives. The main classification feature of belt drives is the *shape of the cross-section of the belt* (Fig. 1).

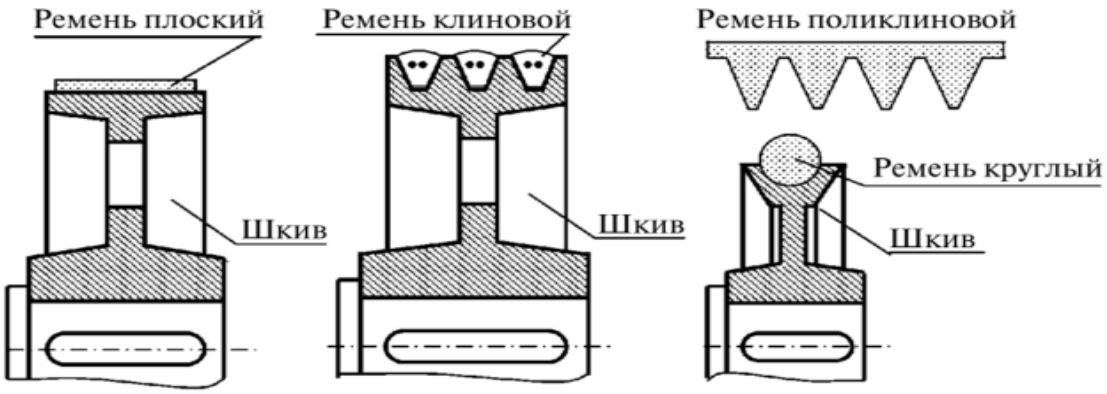


Fig.1. Cross-sectional shapes of belt belts.

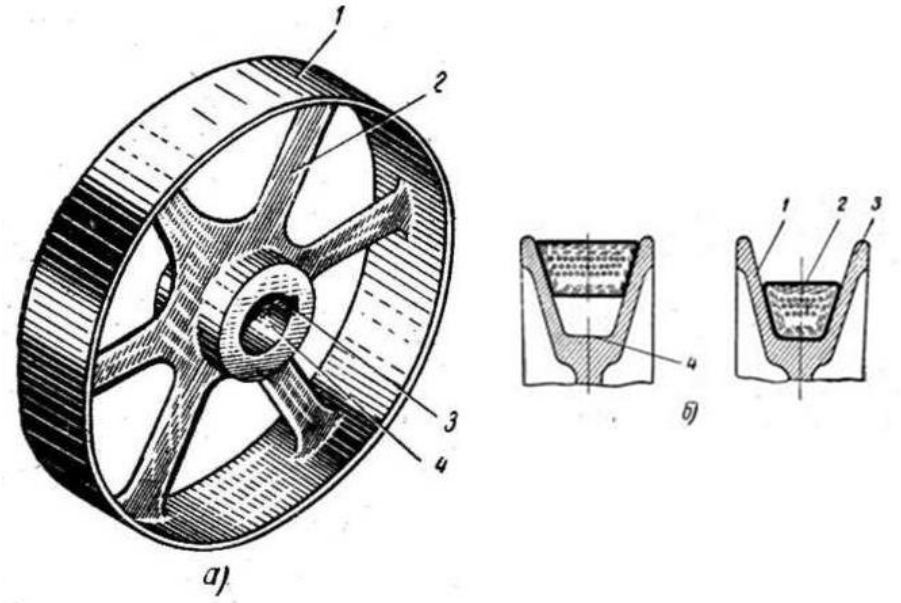
1. Flat-speed transmission. In comparison with other types of belt drives, this transmission has increased performance and durability (due to lower bending stresses in flat belts). It is recommended for use at large center distances (up to 15 m) or high speeds (up to 100 m / s). Flat-speed transmission is structurally the simplest. Flat belts have a relatively higher durability.

2. *V-belt transmission* is currently the most common type of belt drive, used to transmit power up to 400 kW. The maximum speed is up to 30 m/s. The gear ratio reaches *i* = 6 (8).

3. *Compared* to V-belt, the V-belt transmission provides a more even distribution of the load between the belts; this helps to reduce vibrations and increase the durability of the transmission.

4. *Round-trip transmission* is mainly used in household appliances under light loads.

During the operation of belt drives, the rim wears out of the pulleys for flat belts (Fig. 2, *a*) due to belt slippage. Its polished surface loses its smoothness, which impairs the grip between the belt and the pulley. There are also rim fractures, cracks in the spokes, wear of the mounting hole and keyway.



Rice. 2. Belt pulleys: ***a*** - for flat belts (1 - rim, 2 - spokes, 3 - keyway, 4 - mounting hole). ***b*** - for V-shaped belts (1 - groove walls, 2 - belt, 3 - shoulder, 4 - groove bottom.

In the pulleys of V-beltcrossings (Fig. 2, b), first of all, the surfaces of the grooves wear out. This wear is sometimes so great that the belt sinks to the bottom of the ditch, as shown in Fig. 2, *b*, right. There is also a fracture of the shoulders, the balancing of the pulley is disturbed. As a result, vibrations and knocking appear in mechanisms and machines. At the same time, the transmitted forces are significantly reduced, which leads to a drop in machine power.

The following requirements are imposed on the pulleys: - surfaces mating with belts must be treated according to the 5-6th class of cleanliness; - the outer diameter of the pulley must exactly match the specified drawing and provide the required gear ratio; - fractures and cracks are not allowed; - when observed with the naked eye, the runout of the pulley along the outer diameter and at the ends should not be noticed.

Thepiles must be balanced, i.e., balanced. This means that when turning at any angle, the freely rotating, unloaded pulley must stop at the end of the turn so that the lowest position is occupied by a different section of the rim each time.

When thewillow for a flat belt (Fig. 2, a) of the hole 4 is worn, this hole is bored and a sleeve is pressed into it, which is securely locked. The hole of the sleeve is processed for landing on the shaft with the established accuracy.

The worn keyway is expanded by chiseling to the next normal size or the groove is hollowed out in a new place.

In the case of awillow for V-belts (Fig. 2, b), the surface of the rim and walls of the grooves is ground until wear is removed, and the bottom of the grooves is deepened so that the belt takes a normal position in them.

Fractures and cracks are eliminated by welding after appropriate locksmith preparation of places for welding. Before welding, the pulley is evenly heated over the entire diameter, otherwise internal stresses will appear in the metal in the brewed area, which will cause cracks in other places. At the end of welding, the pulley is immersed in heated sand for slow cooling.

Sometimes pulleys are repaired by applying pads and installing new rims, fixed with bolts, screws or by welding. In the latter method, the pulley is also cooled in heated sand. The cooled pulley is ground to give it the required outer diameter (if a new rim is welded); The ends of the pulley are also processed on a lathe.

To maintain the gear ratio between the pulleys, it is allowed to grind to the appropriate diameter and the second of a pair of pulleys, which does not need to be repaired.

The repaired pulley is checked for balance. The identified imbalance is usually eliminated by removing the excess metal, which is cut or raised.

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