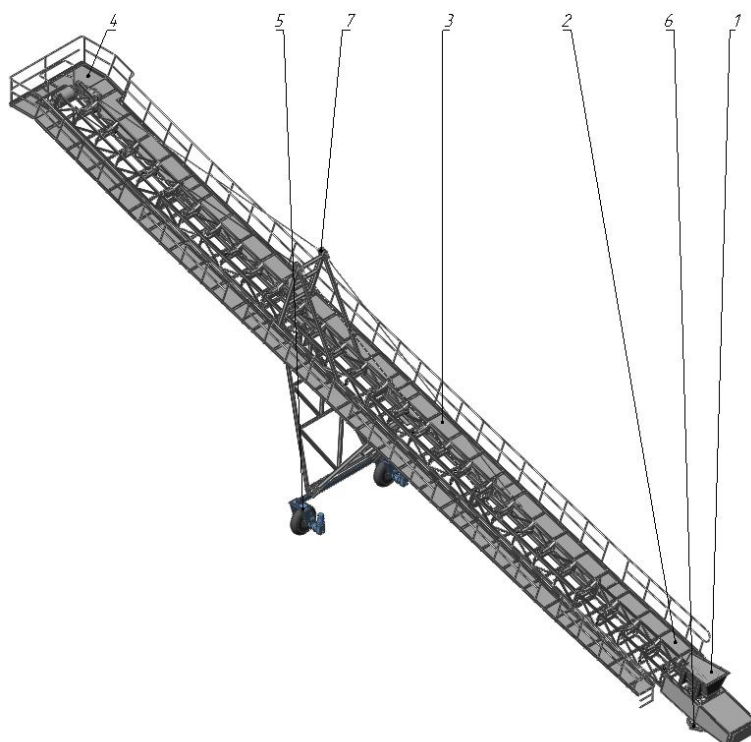


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DETERMINATION OF PARAMETERS AND DESIGN OF A STACKING BELT CONVEYOR



The stacking belt conveyor of the fine coal processing complex is designed to transport fine coal cleaned of fine particles and dusty impurities after it has been reloaded for storage in the commercial coal stacking warehouse (Figure). The stacking belt conveyor of the fine coal processing complex consists of the following parts: fine coal hopper 1, tension section 2, intermediate section 3, drive section 4, conveyor support frame 5, rotating turret 6, upper pylon with rope suspension 7.

Figure – The stacking belt conveyor:
1 – fine coal hopper; 2 – tension section; 3 – intermediate section; 4 – drive section; 5 – conveyor support frame; 6 – rotating turret; 7 – upper pylon with rope suspension

A fine coal processing complex is a complex of special equipment, combined in terms of design and technology, and designed to perform processing together with washing of fine coal [1]. Fine coal, fed to the above complex by a stacking belt

conveyor of the initial product, is moistened with water from irrigation nozzles, classified by size using a vibrating screen with circular oscillations of its box and sieve [2]. The sub-screen fine product is sent to the next stages of processing, and the over-screen coal product, which includes coal with a size of 13 mm or more, is transferred to a stacking belt conveyor and transported to the warehouse. Processing of fine coal, together with its irrigation, is carried out using an inertial vibrating screen with an installed nozzle system [3].

The processing of fine coal with its irrigation has the following features. Fine coal containing small and dusty particles is transported and poured onto the sieve of an inertial type vibrating screen. In order to clean fine coal from small dust particles, it is subject to treatment with a nozzle system.

The belt width of a stacking belt conveyor is determined by the formula:

$$B = \sqrt{\frac{Q}{c \cdot v \cdot \gamma}} = \sqrt{\frac{130}{232 \cdot 2,0 \cdot 1,5}} = 0,571 \text{ м,}$$

where $Q = 130$ – Technical productivity of a stacking belt conveyor, t/h;

v – speed of the stacking conveyor belt, m/s;

γ – bulk density of fine coal, t/m³;

c – empirical coefficient depending on the angle of inclination of the stacker conveyor.

Considering the calculated width of the belt, in accordance with DSTU, a rubber belt 2TA-100 with a width of 650 mm was selected. The design parameters of the stacking conveyor were justified taking into account the selected belt.

The rated power of the electric motor driving the stacking belt conveyor was 13.5 kW.

The calculated rotation speed of the drive drum is determined by the formula:

$$n_d = \frac{60v}{\pi \cdot D} = \frac{60 \cdot 2,0}{\pi \cdot 0,4} = 95,5 \text{ r/m,}$$

where $D = 0,40 \text{ m}$ – diameter of the drum;

$n = 1500$ – engine shaft frequency of rotating.

The calculated gear ratio of the reducer is determined by the formula:

$$i = \frac{n}{n_d} = \frac{1500}{95,5} = 15,7 \text{ r/m.}$$

Thus, the design of the stacking belt conveyor includes a drive consisting of an AIR 160 S4 15 kW electric motor and a KC1-100N gearbox, which meets the needs of the complex for processing fine coal.

In this work, a SolidWorks solid model was developed, technological and design parameters of the stacking belt conveyor were calculated, and the parameters of its components were substantiated.

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