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RESISTANCE TO MOVEMENT OF CRANE WHEELS

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With a satisfactory condition of the road, high-quality manufacture of cranes, the latter work on cylindrical double-rim wheels, work well, but the defects of the road, the difference in diameters of the drive wheels in terms of the way is sharply noted on the performance of the wheels [1, 2]. Correct movement of cranes is provided by flanges, at defects of a way and the crane, intensity of work of flanges leads to the strengthened wear, in our practice the basic weight of cylindrical two-flanged wheels is rejected because of wear of flanges [3, 4].

If the difference in the diameters of the drive wheels is m, the skew of the wheel γ, the ratio of the crane run to its base τ=L/k. When using cylindrical twin wheels take τ=6.

At $m=10^{-3}D$ and $\gamma=0{,}6\cdot10^{-3}$ we have

$$\delta=10^{-3}\pi(D/6)+0{,}6\cdot10^{-3}\pi D=2{,}42\cdot10^{-3}D. \quad (1)$$

For example, at D=630 mm. we have δ=1,52 mm. With symmetrical installation of the wheel on the rail, the distance from the flange to the wheel is 25/2= 12,5 mm., i.e., the gap will be exhausted after 12,5/2,42= 5 turns of the wheel. In fact, the situation is different, as the distance between the rails of the cranes tolerance is 15 mm. At the same time clamping of the crane on rails or at movement of the crane of a track increases or decreases due to deformation of a way and a bearing design is possible.

The strong wear of the flanges indicates a lack of attention to overcoming the skew of the wheels and the quality of the construction of the roads. Tolerances that apply to the laying of rails should be more stringent.

The resistance of the shop bridge cranes in the general case is equal to

$$W=W_t+W_y. \qquad (2)$$

For outdoor cranes, wind loads are added W_b. Resistance on the slopes of the road

$$W_y=iG, \qquad (3)$$

where i – average slope;
G – crane weight.

In the general case i= 0–0,002, sometimes more.
Friction resistance is equal to

$$W_t=aw_tG, \qquad (4)$$

where

$$w_t=\frac{2k+fd}{D}. \qquad (5)$$

The coefficient a is introduced to take into account the friction of the flanges a=1,5/2, sometimes greater than.
f – reduced coefficient of friction in bearings, usually take f=0,001–0,002;
d – bearing diameter;
k – the coefficient of friction of the wheel rolling on the rail.

The value k depends on the size of the contact plane. In the case of a running wheel on a flat rail, we have, based on Duma k=0,1·b experiments at a contact bandwidth of 2b.

At an elliptical platform of contact it is accepted k=0,1*a*, where *a* – the semi-axis of the ellipse oriented on the movement of the crane. The dimensions of the contact plane are determined by the formula of Hertz, which takes into account the magnitude of the load P, the modulus of elasticity.

In the assessment of the coefficient of friction f in the wheel supports there are noticeable differences, we mean the use of rolling bearings.

B.S. Kowalski believed that the value of f=0.01 is quite convincing and somewhat overestimates the real value of friction. This does not preclude the possibility of another estimate of f taking into account the special operating conditions of the crane, such as ambient temperature.

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