

## THE INFLUENCE OF THE RESERVE POWER OF THE HYDRAULIC DRIVE ON ITS STATIC AND DYNAMIC CHARACTERISTICS

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### Abstract

A mathematical model of a belt conveyor hydraulic drive in the MATLAB-Simulink software environment has been studied. The influence of the reserve power of the hydraulic drive on its static and dynamic characteristics is calculated.

**Keywords:** transitional processes, hydraulic drive, belt conveyor.

### Introduction

Today the belt conveyors with the hydraulic equipment are specialized in various branches of economic activity. The hydraulic equipment of the belt conveyor allows are provided the operation of his nodes during emergency overloads (2...2.5 times) due to the means of hydraulic automation [1, 2]. Except this, the reserve power allows does not to stop the belt conveyor during emergency overloads [3].

The aim of the work is to calculate the influence of the reserve power of the hydraulic drive on its static and dynamic characteristics.

### Research results

The solution of the mathematical model of the belt conveyor hydraulic drive was performed using the software package MATLAB-Simulink [3].

On Fig. 1 and Fig. 2 show how the reserve power of the belt conveyor hydraulic drive are influenced the accuracy of speed stabilization  $\delta$ , the amount of overregulation  $\sigma_{on}$  when the reserve hydraulic motor is turned "ON" and when it is turned "OFF"  $\sigma_{off}$ .

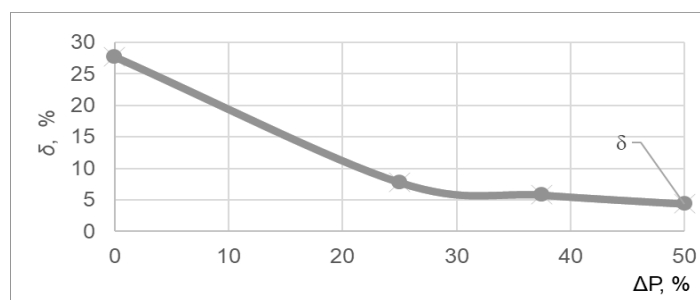


Fig. 1. The static characteristic of the belt conveyor hydraulic drive

On the abscissa axis (Fig. 1 and Fig. 2) is the reserve power parameter of the belt conveyor with the reserve hydraulic motor and without the reserve pump, that is why  $\Delta P=0$ . Under these conditions, the hydraulic drive of the belt conveyor reduces its performance. The speed of rotation his drum is dropped significantly and the obtained transitional processes are the worst. Options for increasing the reserve power to 25%, 37.5% and 50% were also considered, which in turn significantly affects the dynamic characteristics.

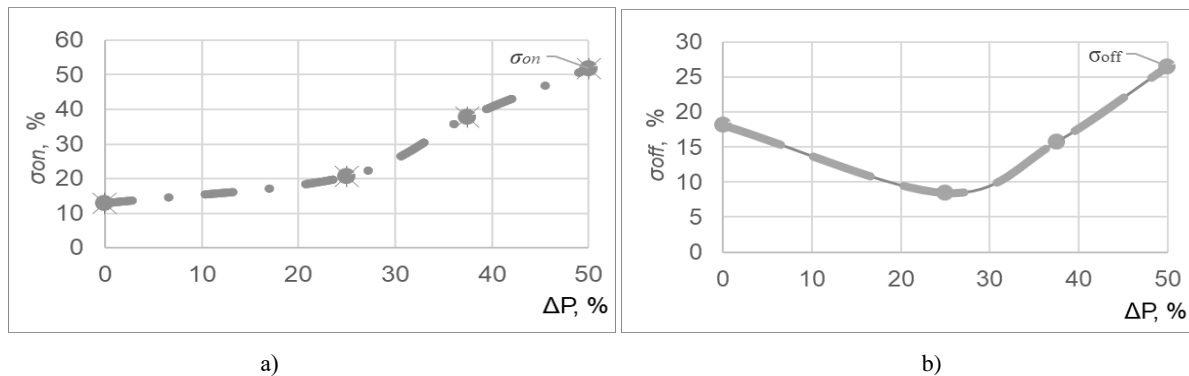


Fig. 2. The dynamic characteristics of the belt conveyor hydraulic drive

## Conclusions

Transient processes during the activation and the deactivation of the reserve power in the hydraulic drive of the belt conveyor are calculated. It is recommended to use the reserve power of the capacity  $\Delta P=25\%$ , which provides high-quality static and dynamic characteristics:  $\delta=7.8\%$ ;  $\sigma_{on}=20.7\%$ ;  $\sigma_{off}=8.4\%$ .

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### *Вплив резервної потужності гідроприводу на його статичні та динамічні характеристики*

#### *Анотація*

*Досліджено математичну модель гідроприводу конвеєра в середовищі програмного продукту MATLAB-Simulink. Розраховано вплив резервної потужності гідроприводу на його статичні та динамічні характеристики.*

**Ключові слова:** перехідні процеси, гідропривод, стрічковий конвеєр.

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