

VIBRATING HYDRAULIC DRIVE

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The efficiency of manufacturing equipment application depends on the possibility of the power drive characteristics prediction. Due to small sizes and weight and the capabilities that they provide, hydraulic systems are used in the most current manufacturing machinery. For some processes, especially for wood wastes briquetting, it is advisable to impose vibration on the movement of an operational mechanism. The vibration movement improves briquettes characteristics. The development of the mathematical model of the vibrational hydraulically driven press for wood wastes briquetting is the topical scientific problem that has some practical application in industry.

Different scientists have done a lot of research concerning the vibrational hydraulic drivers applied to the operating mechanisms of the manufacturing equipment.

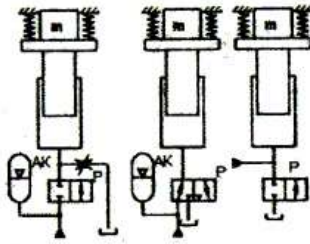
A mathematical model of hydroimpulsive drive is known to be used for compaction of powder material blanks in the enclosed molds during the process of inertial load. The difference between the given schemes is defined by the way the vibration exciter P is connected with void of to the hydraulic cylinder.

There are two ways of vibration on exciter connection:

- in the inlet – the temporary connection of the hydraulic cylinder working cavity with the pump line and drain happens through the vibration exciter P.

- in the outlet – the working cavity of the hydraulic cylinder is connected directly with the pump line, and the vibration exciter P occasionally connects it with the drain.

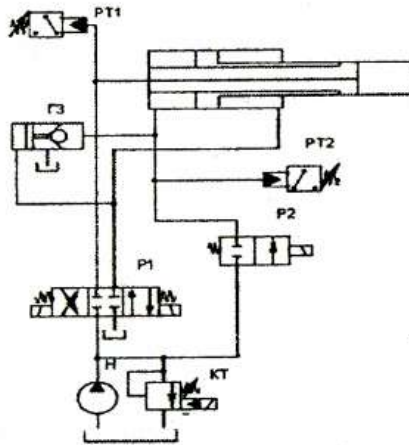
The schemes considered above provide periodical fluctuation of the hydraulic motor outgoing element relatively to the definite initial position. To get the wastes compaction it is necessary to provide the movement of the motor outgoing element together with the imposed vibration on this movement. At the same time hydraulic cylinder capabilities change as the wastes are compacted.



Picture 1 - Principles charts

One of the main specialties of the hydraulically driven press for wood wastes briquetting is also the application of the hydraulic cylinder with two pistons which provide one workload. The problem of such hydraulic systems is not covered in detail.

It is necessary to design the mathematical model of the vibrationally driven press for wood wastes briquetting which takes into account the operational particulars of hydraulic cylinder with two pistons, the ability to be two-phase, the compression of hydraulic liquid, and also nonlinear characteristics of the drive elements.



Picture 2 – Chart of a vibrationally driven press

The obtained system of equations allows to investigate dynamic characteristics of the hydraulically and vibrationally driven press for wood wastes briquetting both in the prior pressing mode (without applying vibration), and in the basic mode.

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