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APPLICATION OF FLUID POWER IN MECHANISMS FOR PROCESSING AND CUTTING OF METAL AND FERROCONCRETE DETAILS

In SPbSUACE (SPbGASU) at the cathedra of Road-Making, Construction Machines and Equipment alongside with other problems of designing and operation of road-making and construction machines makes the researches of vibro-cutting process of metal and ferroconcrete details with application a fluid power control. The vibration frequency used for vibro-cutting is from 25 Hz up to 10kHz.

In the first process vibro-cutting was studied theoretically on the basis of model submitted in Fig. 1. Here is: m_1 - weight of the piston; m_2 - weight of scissors; b_1 - factor of resistance of a core and spring; b_2 - factor of resistance of pressure fluid; b_3 - factor of resistance of external environment; $ó_1$, $ó_2$ - generalized velocity; $Ñ_1$, $Ñ_2$, $Ñ_3$ - factors of rigidity: springs of the cylinder ($Ñ_1$), pressure fluid ($Ñ_2$), scissors ($Ñ_3$).

The constructive decisions for realization of processing of metals by pressure with imposing of acoustic vibrations, cutting of piles and stand for the study of vibro-cutting process also were offered. These decisions were protected by the copyright certificates: SU 1098693 A, SU 1030494 A, SU 1156870 A. The simplified schemes of these devices are shown further in figures.

The scheme of the device for metals processing by pressure with imposing of acoustic vibrations is shown in Fig. 2. Such equipment is used for cutting and for deformation of metal.

The scheme of the stand for study vibro-cutting process is shown in Fig. 3. This equipment is used for cutting of metal.

The scheme of the device for cutting of piles looks similarly as fig. 3. The difference consists in the special working attachment. This attachment makes it possible to cut ferro-concrete details.

The optimal working process parameters: vibration frequency, vibration amplitude and effort of cutting were detrermined for these devices. In experience was received such result: application of vibration

can reduce the cutting effort up to 58%. Maximal reducing of cutting effort was received for metal cores which have diameter 3…5 mm with application optimal vibration frequency

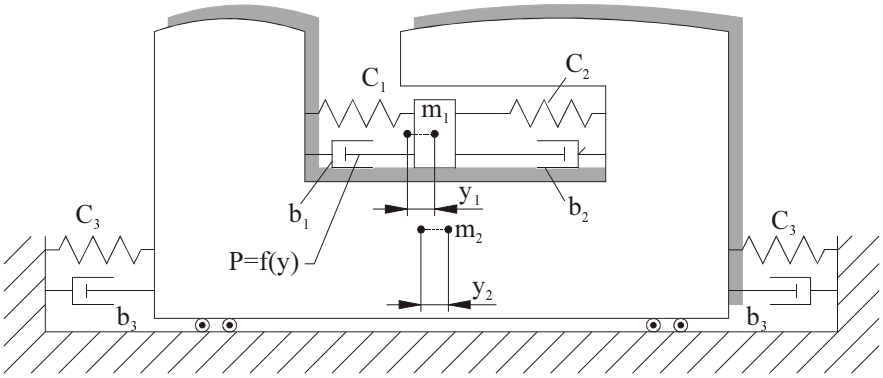

Fig. 1.

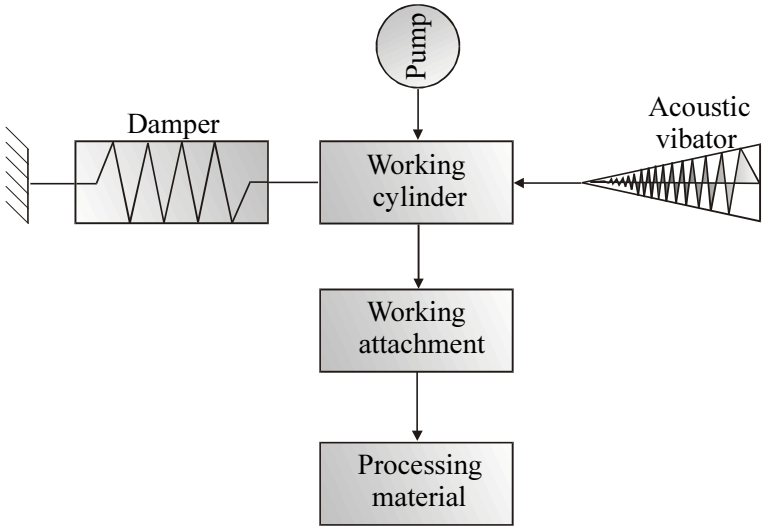

Fig. 2.

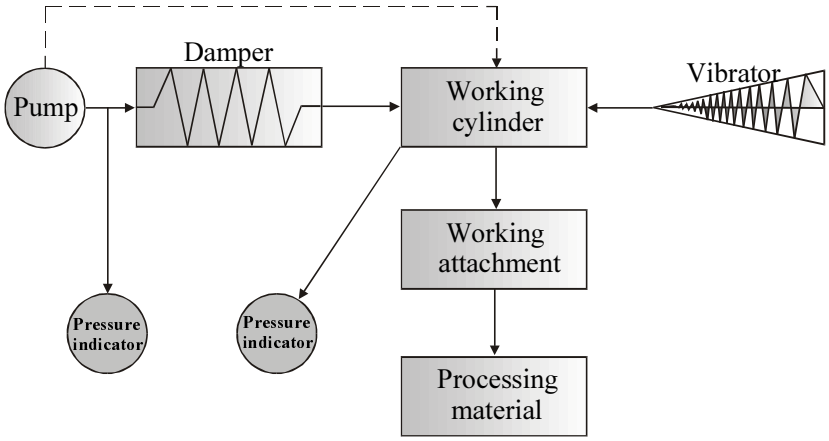

Fig. 3.

References:

1. Jevtiukov S., Popov A., Rajczyk J. Propozycje analizy efektywności procesu mechanizacji // Maszyny urządzenia & narzezia ¹2/97. 1997. S. 8–9.
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