WORKINGS OF THE METALWARE, OBTAINED BY COLD PLASTIC DEFORMATION BY THE PULSATORY GAS FLOW WITH THE USE OF AN EFFECT OF THE RESONANCE

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Abstract: The effectiveness of the action of the pulsatory gas jets structural strength of metallic materials depends not only on the duration of blowout and energy of the pulses of gas, but also on the frequency of these pulses. Invention made it possible to obtain technical result, namely: to increase the reliability of the metalware, obtained by cold plastic deformation due to an increase in their plasticity and viscosity without reduction in the strength indices and hardness, and to also reduce the duration of working by the pulsatory air flow.

Keywords: metal working, that pulsate of gas jets, resonance effects.

The metallic machine parts, instruments, other equipment of those obtained by plastic cold deformation often are exploited without the subsequent working, after acquiring its final mechanical properties in the process of the plastic distortion, which is accompanied by strain hardening. Strain hardening, increasing the values of strength indices, sharply decreases plasticity and impact toughness. This working as annealing, contributes, depending on temperature, to decrease or to the complete elimination of strain hardening, but in this case the weakening of article occurs. The task of increasing the reliability of the articles, obtained by cold plastic deformation due to an increase in their plasticity and viscosity without reduction in the strength indices and hardness, is immediate. Before the invention is posed the problem of increasing the reliability of the metalware, obtained by cold plastic deformation due to an increase in their plasticity and viscosity without reduction in the strength indices and hardness, and also reduction in the duration of working by the pulsatory air flow.

Solution of the problem presented they reach by the fact that the obtained by cold plastic deformation articles made of the metallic materials subject in the plenum chamber of the generating fluctuations installation, which ensures the levelling off of the flow parameters in the transverse plane, to the action of the pulsatory subsonic air flow [1-6], of that having the frequency, which corresponds to the natural vibration frequency of workpiece and the sound pressure 100-145 dB at a temperature, which corresponds to the value of the temperature in the plenum chamber, lowered relative to air jet room because of the cooling with the expansion, being located in the range from -20° C to +5° C. With interaction of the pulsatory gas flow with the obstacle, in the latter can

appear and be extended mechanical waves. By mechanical wave is understood the process of the propagation of fluctuations in the elastic medium, which is accompanied by the energy transfer from one point of medium to another.

The effectiveness of the action of the pulsatory gas jets structural strength of metallic materials depends not only on the duration of blowout and energy of the pulses of gas, but also on the frequency of these pulses.

If pulse frequency is close to the frequency of the natural (free) vibrations of the blown out metalware, is possible resonance and significant increase in the influencing the metal pulses, which can contribute to the intensification of the processes of dislocatory reconstruction of the structure of metallic material and to a change in its mechanical properties.

The frequency of induced oscillations of model as a whole they correspond to the frequency of the vibrations of the leaking-in to it gas flow. The natural fluctuations of model are calculated by the formula depending on mass, lengths, Young's modulus and moment of inertia. The resonance effects, which exert additional influence on the structure of material, must be observed with the agreement of the frequencies of the vibrations of the flow parameters with the natural fluctuations of model (system). So for steel 40 during the arrangement of impact test models from the cold rental with the degree of deformation 50% across the pulsatory air flow allotted for one end, with the natural vibration frequency, which are 3787 Hz and which correspond to the frequency of the vibrations of the leaking-in flow, after blowout during 5 min. impact toughness composed 0,8 MJ/m^2 against 0,6 MJ/m^2 without the blowout or to 25% more, with not less high values of the strength indices and hardness and higher plasticity.

Thus invention made it possible to obtain technical result, namely: to increase the reliability of the metalware, obtained by cold plastic deformation due to an increase in their plasticity and viscosity without reduction in the strength indices and hardness, and to also reduce the duration of working by the pulsatory air flow.

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