Search devices for updating of turbo-seating of power plants

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Search devices for updating of turbo-seating of power plants: *The model of a destruction processes of power plants turbo-seating and the massif is created at a block strong stone production. The analysis of schemes of fronts arrangement of the reflected waves from various surfaces, schemes of an arrangement of the giving and reflected waves, tension schemes from sites of an interference and diffraction waves of the strengthened stretching tension is given.*

Key words: *Search devices, Turbo-seating, Power plants.*

INTRODUCTION

The problem of cracks development in the undesirable direction due to the reflected explosive wave results in the processes of destruction of a monolith in the form of artificial (turbo-seating) [1, 2] and natural (production of a block strong stone) mineral environments.

The most effective way for the solution of this problem there were acoustic screens [3, 4] which allow to operate waves of tension in solid bodies due to creation of environments with significantly various acoustic rigidity.

EXPOSITION

Researches on management of energy waves of tension (compression and tension) allowed to develop a series of the elliptic devices working by the principle of reflection, concentration and a drain of energy, wave and gases in the closed volume [3, 6]. Among these devices, the devices based on high-temperature supersonic flows [7] and cryogenic processes [8] are developed.

At distribution of waves of tension in the massif of turbo-seating and in the rocks, destroyed by explosion, distribution of energy waves of tension happens in proportion in all volume, i.e. extensively from a charge there is an equal quantity of energy. The technical features of conducting mining operations on pits provide at least two flatness baring existence from which the possibility of the reflection and return of part of energy of a tension wave towards a source of indignations (charge) occurs.

Therefore, if to take energy of a tension wave for 100%, as a result of reflection from two free planes 33,3% of energy comes back towards a source of power tension, and other 66,7% - dissipate in the massif of the base or rocks in the form of seismic fluctuations. Reflection of additional quantity of energy waves of tension from three additional free surfaces leads to the increase of the general energy potential in the destroyed environment [9, 10].

Solving a problem of creation of the crack passing on an axes of an arrangement of shots hole (wells) and separation (shift) of the block from the massif, accepting the size of necessary charges for this purpose even if minimum, it can appear and resulted in the specified dangerous zones, where, there would be a breed destruction since the stretching tension will reach critical values and cracks would be appeared. Further decrease (reduction) of charges can lead to splitting as defective: the continuous main crack won't be formed, there will be a curvature of passers (meeting halfway from the next shots) cracks.

At the same time from the opposite side from shots (wells) energy of blast waves will be disseminated in the massif, transformed eventually to seismic waves and, therefore, won't be used for the positive purposes. Therefore, there is a fork, above and below which refuse will be observed. The fork is wider, the reliability of process is higher.

The desining of an acoustic field of a blast wave by means of the thermodynamic field created by three thermal sources, showed its high efficiency. The created powerful thermal screen due to the fields generation of deformations and thermal tension is an obstacle on distribution of the reflected blast wave causing emergence and development of destructive cracks [11, 19].

For comparison, we can present the interferential pictures of the strongest rock (granite) (fig. 1) and viscous, porous breed – a tufa (fig. 2). Both screens will be useful depending on properties of maternal breed to create two environments with significantly various sizes of acoustic rigidity and by that, to provide management of the reflected blast wave.

Holographic installation of rock samples is presented in works [16, 17], a technique of carrying out experiences and decoding of interferogram with determination of thermal deformations sizes- in works [18, 19].

Thus, the model of a destruction processes of power plants turbo-seating and the massif is created at a block strong stone production. The analysis of schemes of fronts arrangement of the reflected waves from various surfaces, schemes of an arrangement of the giving and reflected waves, tension schemes from sites of an interference and diffraction waves of the strengthened stretching tension is given. This model allowed to recommend the developed screens on protection against the reflected blast waves, the using principles of acoustic and thermodynamic influence.

Acoustic screens are investigated on pulse holographic installation, and thermodynamic – on holographic installation in real time scale.

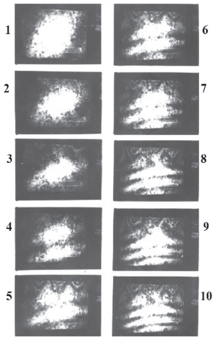

Fig.1. The holographic interferograms of granite displaying a condition of a surface over each 6, at a thermal flow of 15 W

Loading of a sample was carried out from a state 1 to a state 10.

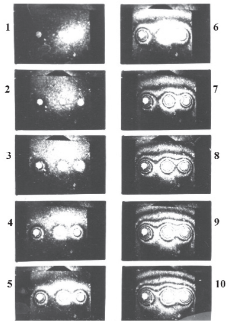

Fig. 2. The holographic interferograms of a tufa, displaying a condition of a surface over each 6, at a thermal flow of 15 W

Loading of a sample was carried out from the state fixed by 126 with to a state 180 (number of positions 1-10).

The examination of turbo-seating, supervision over a collapse and deformations are conducted at thermal power plants (TPP). If it necessary,there is made selective breakings, cutting down, broadenings and destructions of ferroconcrete [1].

Carrying out explosive works on the directed splitting of ferroconcrete turbo-seating has to exclude emergence and the development of cracks in the main mass [2].

For the management of the direction of crack distribution from the reflected blast wave devices for the aimed splitting which general view is shown in fig. 3 and in a section in fig.4 are developed. This device can be applied to ferroconcrete turbo-seating and to obtain blocks of strong rocks [5].

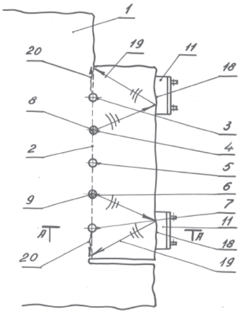

Fig.3. Scheme of management of the distribution direction by a crack, general view:

1 – turbo-seating; 2 – the line of the planned split; 3 – 7 – shots; 4 – 6 – shots with the explosive substances (BB) (8,9); 11 – the device for capacity; 18 – sites of a wave reflection; 19 – blast wave; 20 – crack direction.

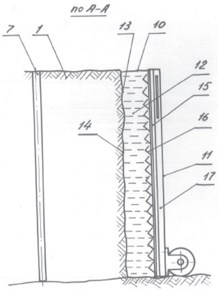

Fig.4. The scheme of management of the distribution direction by a crack, A-and coal mine on fig.1:

1 – turbo-seating; 7 – shot; 10 – capacity; 11 – the device for capacity 10; 12 – liquid; 13 – elastic wall; 14 – longitudinal plane of an exposure; 15 – opposite wall of capacity 10; 16 – ribbing; 17 – rigid frame.

The thermodynamic screens which will be installed to a dress or instead of the device 11 (fig. 4) is studied. For weakening of the reflected blast wave of 19 (fig.3). Such screen is alternative way of management of the reflected blast waves.

Researches were conducted on five samples, executed from various rocks (fig. 5). Three shots with a diameter of $6 \cdot 10^{-3}$ m on depth of $12 \cdot 10^{-3}$ m perpendicular to a surface of a big side (samples No. 2 and No. 5), or perpendicular to a surface of a small side (sample No. 1) were bored through. Thus, the thermodynamic screen was created at inclusion of three sources of the electric power. Also one thermal source (samples No. 3 and No. 4) was investigated.

The brought power made 7÷30 of W. With a diameter of drillings (3÷6)•10^{-3} of m specific thermal streams reached sizes

$$q = \frac{N_э}{F_ш} = \frac{7 \div 30}{\frac{\pi}{4}(3 \div 6)^2 \cdot 10^{-6}} = (0{,}25 \div 4{,}2) \cdot 10^6 \ Вт/м^2. \quad (1)$$

The method of a holographic interferometry was used for the research of porous screens. The strained and deformed condition of samples was studied. Deformations of samples were registered in real time [18].

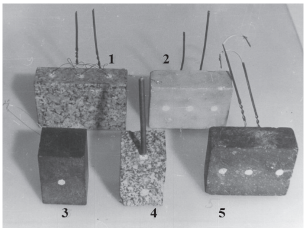

Fig.5. Studied samples of rocks:
1 – granite; 2 – marble; 3 – tufa; 4 – granite; 5 – tufa.

Frequency of photography of interferograms – 0,5 frames per second; it was made on 30 pictures from each sample. Photoprints through two frames displaying a condition of a surface of samples every 6 seconds are placed.

CONCLUSION

Thus, the knowledge of the law of distribution of tension in a volume porous material allows to reduce probability of emergence of destructive cracks at design of devices on direction management of distribution of cracks in the split block (turbo-seating). Each rock heated by three thermal sources at the same time, is powerful thermodynamic screen, capable to absorb and disseminate the reflected blast waves. The type of the thermodynamic screen is selected depending on a material of the split block and the chosen technology of split taking into account coefficient of acoustic rigidity of contacting environments. The thermodynamic screen can independently be installed, and together with the screens containing capacity with a ribbing.

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This paper has been reviewed.