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DESIGN AND OPERATION EFFICIENCY OF VIBROSIT

The modern pace of development of drilling in the development of oil and gas fields has ensured that manufacturers have improved this type of drilling equipment. Today, the efficiency indicators of the vibrating screens used are significantly superior to their earlier analogues and models. One of the key advantages of modern vibrating screens compared to older models is their compactness. The range of drilling equipment of this type includes products with different indicators of overload coefficient, material and working area of the mesh, as well as the type of oscillatory movements. Vibrating screens with circular motion develop low gravitational forces and have the greatest transport capacity, which contributes to better removal of clay rocks in the upper intervals, reducing their impact on the surface of the mesh, at the same time they have low drainage capacity. This type of vibrating screen is sometimes used for preliminary cleaning of the solution from large clayey rocks, but conveyors with a rotating coarse mesh have become more widespread for this purpose. Vibrating screens with elliptical motion develop increased gravitational forces compared to type 1 and have lower transport capacity compared to types 1 and 3. They have found application when working with weighted solutions and as drying sieves for slurry from hydrocyclones. It should be noted that the slower the sludge is removed from the vibrating screen, the more intense the wear of the screens occurs. Vibrating screens with linear motion are the most versatile, they demonstrate increased gravitational forces and relatively fast transport capacity, depending on the angle of the frame and the position of the vibrators.

Over the past years, the main direction in the development of vibrating sieves has been the transition from flexible tension sieve cassettes to sieve cassettes on a rigid base - plastic or metal. A tension flexible sieve cassette consists of two woven metal meshes (a large-mesh load-bearing mesh and a fine-mesh working mesh), fastened together by a flexible plastic – usually polyethylene – grid by thermal sintering. The edges of the mesh adjacent to the sides of the vibrating screen are designed in the form of brackets, by which the mesh is stretched by tension devices, resting on the longitudinal rubber-coated ribs of the vibrating frame. In cross section, the enveloping surface passing along the tops of the ribs is slightly curved, which provides a convex cylindrical shape of the working surface of the mesh. Thanks to this, the mesh fits more securely to the ribs and, with uniform tension, the sieve fabric is less likely to sag.

A rigid sieve cassette on a plastic base consists of the same two meshes held together by a plastic grid, but this grid is made in the form of a rigid frame about 40 mm thick. Such a cassette does not require tension devices since the mesh on it is stretched in advance during the manufacture of the cassette. Such a cassette is attached to a vibrating sieve using simple wedges or clamps. A rigid cassette on a metal base differs from a cassette on a plastic base in that the frame of such a cassette is made not of plastic, but of metal, and the molten plastic holds together both the mesh and the metal frame with the mesh.

The performance of flexible cassettes significantly depends on the quality of their tension. Even a slight local sagging due to inaccurate operator actions or design defects leads to the cessation of sludge transportation along the surface of the cassette. This is due to the occurrence of natural vibrations of the mesh in poorly stretched places of the sieve fabric in antiphase with the vibrating frame. At the point of sagging, the mesh quickly fails, wearing out in contact with the supporting ribs. The main advantage of rigid cassettes is their independence from operator actions. Constant good tension of the sieve surface of rigid cassettes, that is, the absence of oscillations of the mesh in antiphase with the vibrating frame, provides better conditions for transporting sludge and greater durability. Another significant drawback of flexible cassettes is the working surface that is curved upward, which leads to preferential flow of the solution along the sides. Hard cassettes are free from this drawback.

The only drawback of rigid cassettes compared to flexible ones is their higher cost. The consumption of sieve cassettes increases if technological services unjustifiably increase the range of screens used for drilling intervals, forgetting that a vibrating sieve is, as a rule, a means of preliminary cleaning of the solution rather than the main one.

The creation of vibrating screen meshes is the Mi-SwacoDuraflo mesh on a composite frame. Duraflo'spatented Snap-Lok screen repair system for the Brandt VSM 300 vibrating screen reduces repair time to two minutes. You just need to remove the mesh from the vibrating sieve and insert the factory-made plug. This system eliminates the need to remove damaged screen material and does not require time-consuming cutting, gluing or joining. XR Mesh provides extended service life and exceptional throughput. Combining XR Mesh with Duraflocomposite frame technology allows for exceptionally increased throughput, which in turn reduces the load on the mesh compared to conventional screen panels, further extending its service life. The undeniable advantage of meshes on a composite frame is their quick replacement if necessary.Experience in using vibrating screens for drilling mud cleaning has shown that cleaning efficiency increases as the time the particles remain on the screen increases. This can be achieved by increasing the length of the mesh, reducing the flow speed, reducing the angle of inclination of the mesh, changing the direction of movement of particles, reducing the amplitude of mesh vibrations, and the simultaneous use of two serial or parallel meshes.

An analysis of the designs of vibrating sieves from modern manufacturers shows that the emphasis in their design is on the following:

- reduction of parts replacement time;
- increasing the turnaround time by improving designs and materials for the manufacture of meshes and main elements of vibrating sieves;
- increasing the residence time of the sludge particle on the vibrating sieve along with the possibility of changing its throughput by varying the types of vibrations;
- the ability to adjust the operation of the vibrating sieve within a wide range, often remotely.

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