The Influence of the Material on the Process Parameters of the Vibrating Screen

GHEORGHE I. ENE*
Politehnica University of Bucharest, 313 Splaiul Independentei, 060042, Bucharest, Romania

In this work are presented the conjugated influences on the sieving process of two elements namely the friction between the sift material and screen and the locking mesh of sieve with grains unable to cross the screen. The process parameters of the vibrating screen are determined, observing the influence of these factors upon the sieving process.

Keywords: screening, sieving process, vibratory screen, screening machine

The sieving process needs, to be achieved, that the movement of the screening materials to be, in comparison with the sieve of screen, either by sliding, or by jumpings [1, 7 - 9].

The run of the screen, as well as the sieving process, are influenced, by twoo factors: the friction between the material and the sieve, as well as the locking of the mesh of sieve by of grains.

The movement of the material in the plan of the screen is determined, between others, by the friction coefficient between the material and the sieve. Generally, the friction between material and screen is defined by coefficient Coulomb friction, the sieve being either of cloth or sieve plate, a rugged surface.

The granular material, depending on the relation between their dimension and that of the screen holes, can pass, or remain on screen, or fix in that, blocking them (difficult grains). The grains blocking the screen holes are an obstacle for sieving capacity, diminishing the real surface of separation and reducing the efficiency of the process. To eliminate the „difficult grains” from the screen holes, are necessary values of acceleration higher than normal; this determine irregular movement of the material on the sieve, with unfavourable consequences on the sieving process.

The coefficient of friction between material and sieve

The friction coefficient between material and sieve depends on constructive type of the sieve (screen mesh or sieve plate), on the type of the material used for sift, and on its characteristics: granulation, granulometric composition, grains shape(roundness of edges and angles), microgeometry of surfaces of grains (their rugosity and porosity) etc. All these factors influence, with different weight, upon the friction (between material and screen) and also on the internal one (between different grains stratum) [2]. The external friction influences the slide of the material on the separation surface, and the internal one determines the segregate capacity of grains in stratum, both of them with influence upon the efficacy of the sieving process and the energy consumption. Consequently, it is necessary to know, with precision, the friction coefficients, if it is possible, by experimental determination. For the majority of the granular materials, the friction on sieve cloth depending on the diameterd of screen wire, consequently on its rugosity, determined experimentally for sand (fig. 1) and ground bricks (fig. 2) [4].

The experiments were realised on laboratory stands screens, with different dimensions of the holes (0.2…25 mm) situated on a plane surface. Grain-size fractions 0.50…0.16; 1.00…0.50; 2.00…1.00 mm and a granular mixture composed of all these fractions in a percentage of 33.33% were tested.

From the graphics analyse of figures 1 and 2, we can establish as follows.

From the fraction 0.50…0.16 mm, the friction coefficient has higher values for sieves with holes dimensions 0.200…0.315 and 0.500 mm, meaning comparable with...
the inferior limit of the fractions dimensions domain, because the grains are locking the screen holes.

When screen holes dimensions exceed the superior limit of the domain of fraction dimensions, the grains penetrate the screen holes, the friction being now between material layers, and the friction coefficient determined is that for the internal one.

For fractions 1.00…0.50 mm and 2.00…1.00 mm, the values of the coefficient of external friction also increases, in proportion with dimensions of the screen holes (its „rugosity”) until the dimensions of the screen holes become equal to the superior limit of the internal between dimensions of the fraction, after which the friction coefficient determined is that of internal friction.

The grain mixture formed in equal parts from the three fractions (0.50…0.16; 1.00…0.50; 2.00…1.00 mm) has a constant friction coefficient, which value is equal with that of internal friction coefficient. The fact is explicable by segregation of fine particles, by self acting during formation of material layer on the screen, passing through screen holes. In this way, the superior layers of grains do not rub direct on screen, but on layer of grains moved in its holes (the friction coefficient being the internal one).

**The clearing of screen holes**

In general, the screen is considered as a continuous ruged surface, without considering the presence of holes and, consequently, the fixed grains in screen. In reality, the „difficult grains”, with dimension near of that of screen holes, remain fixed, blocking them and reducing the active surface area of screen, with known unfavorable consequences.

We consider a spherical grain with \( d \) diameter which blocks the circular hole with diameter \( d_p \), of the horizontal screen moving in its plane (fig. 3) [6].

To remove the grain from the screen hole, this must have the acceleration \( a \), resulting in the appearance, upon the grain, of the inertia force:

\[
F_i = m \cdot a = G \cdot \frac{a}{g}
\]

(1)

where:

- \( G \) is the weight force of grain mass \( m \);
- \( g \) – gravity acceleration.

To unlock the hole, it is necessary that the moment of inertia force, relative to the screen edge (point \( A \)), to pass beyond the moment of weight force relative to the same point (fig. 3):

\[
\frac{G}{g} \cdot a \cdot h \geq G \cdot \frac{d}{2}
\]

(2)

where the arm of inertia force has the expression:

\[
h = \frac{d}{2} \cdot \tan \theta.
\]

(3)

From relationships (2) and (3) results:

\[
a \geq g \cdot \tan \theta = g \cdot k_i
\]

(4)

where:

\[
k_i = \tan \theta
\]

(4')

is the coefficient for blocking screen holes.

Because \( a = r \cdot \omega^2 \) \( (r - \text{amplitude of vibratio of screen}; \omega - \text{proper pulsation of the disturbing force}) \), condition (4) becomes:

\[
K_d = \frac{r \cdot \omega^2}{g} \geq k_i
\]

(5)

where \( K_d \) is the dynamic coefficient of the the screen.

For limit:

\[
K_d = \frac{r \cdot \omega^2}{g} = \tan \theta = k_i
\]

(5')

If it is not considered the presence of holes (smooth plate, unperforated), the grain is put in movement, then the inertia force pass beyond the force of friction between grain and screen, meaning since when the acceleration of screen is:

\[
a > g \cdot \mu
\]

(6)

where \( \mu \) is the coefficient of friction between the material and the screen.

Therefore, the holes of the screen have no influence upon the movement of grains, if:

\[
a = g \cdot \tan \theta \leq \mu \cdot g.
\]

(7)

From the condition (7), results:

\[
\tan \theta \leq \mu = \tan \varphi
\]

(8)

or

\[
\theta \leq \varphi
\]

(9)

where \( \varphi = \arctan \mu \) is the Coulomb friction angle between material and screen, considered smooth (without holes).

For example, for \( \mu = 0.4 \) \( (\varphi = \arctan 0.4 = 22°) \), the grains will not block the screen holes if \( \theta \leq 220° \).

From the figure 3 results:

\[
\frac{d_p}{d} = \frac{1}{\sin \theta} = \sqrt{1 + \tan^2 \theta}\]

(10)

and the condition that the grains should not block the screen holes, becomes:

\[
\frac{d_p}{d} = \sqrt{1 + \tan^2 \theta} \geq \sqrt{1 + \tan^2 \varphi} = \sqrt{1 + \mu^2}.
\]

(11)

For example, for \( \mu = 0.4 \), the grains will not block the screen holes if:

\[
\frac{d_p}{d} \geq \sqrt{1 + \mu^2} = \sqrt{1 + 0.4^2} = 2.7
\]

meaning if: \( d_p \geq 2.7 \cdot d \).

---

Fig. 3. Shutting of the screen hole by grain
Using the relationship (5') and (11), the numerical dependences from table 1 and graphic dependences from the figures 4 and 5 between the angle $\theta$, the blocking coefficient $k_b$ and the ratio between the grain dimensions and of hole $d_p / d$.

The analysis of table 1 and of figures 4 and 5 make us observe that the tendency of blocking screen holes is higher when the grains dimensions are closer to holes dimensions. For example, for the "difficult" grains, with $d_p = 1.02 \cdot d$, the value of the blocking coefficient is $K_b = 5.55$, and the acceleration necessary for screen, to avoid the holes blocking is:

$$a = g \cdot k_b = 9.81 \cdot 5.55 = 54.5 \text{ m/s}^2$$

meaning more than the values usually in practice.

The holes blocking tendency is more reduced for screens tilted opposite to horizontal, which vibrate in their plane, for which the blocking coefficient, determined in a similar way with those for horizontal screen, has the expression:

$$k_b = \tan(\theta - \beta) \quad (12)$$

The higher the inclination angle of the screen relative to the horizontal plane the smaller the danger of blocking the grains in the screen holes.

### The Determination of Process Parameters of the Screen

We consider a screen with sieve inclined with angle $\beta$ against horizontal, produces vibrations according to linear trajectory which form the throwing angle $\gamma$ with the direction of the screen (angle $\alpha$ with horizontal) (linear vibration). The screen is operated with the help of a vibrations generator with crank gear (eccentric gear).

### The Working Condition with the Moving of the Material by Sliding on Screen [3, 5]

**Upsliding motion of the material on the screen**

Forces acting on material grain in this case are presented in figure 6.

The grain is upsliding on screen if the following condition is fulfilled (fig. 6):

$$F_i \cdot \cos \gamma - m \cdot g \cdot \sin \beta = F_j$$

(13)

From relation (13) we obtain:

$$K_a = \frac{r \cdot \omega^2}{g} \geq \frac{\sin(\varphi + \beta)}{\cos(\varphi + \gamma)}$$

(16)

The revolution of crank (eccentric) of the driving mechanism for which the condition (16) is fulfilled, is determined by the relation:

$$n \geq \frac{30 \cdot g \cdot \sin(\varphi + \beta)}{r \cdot \cos(\varphi + \gamma)} \quad \text{rot/min.} \quad (17)$$

($r$ is expressed in m, and $g$ in m/s²).

### Table 1

<table>
<thead>
<tr>
<th>$\theta^\circ$</th>
<th>10</th>
<th>20</th>
<th>30</th>
<th>40</th>
<th>50</th>
<th>60</th>
<th>70</th>
<th>80</th>
</tr>
</thead>
<tbody>
<tr>
<td>$K_a = \frac{r \cdot \omega^2}{g} = \frac{\tan(\theta - \beta)}{k_b}$</td>
<td>5.80</td>
<td>2.90</td>
<td>2.00</td>
<td>1.50</td>
<td>1.30</td>
<td>1.15</td>
<td>1.06</td>
<td>1.02</td>
</tr>
<tr>
<td>$d_p / d$</td>
<td>0.059</td>
<td>0.346</td>
<td>0.560</td>
<td>0.825</td>
<td>1.172</td>
<td>1.692</td>
<td>2.691</td>
<td>5.555</td>
</tr>
</tbody>
</table>

---

**Fig. 4.** The graphic representation of dimensions $K_a = \frac{r \cdot \omega^2}{g} = \frac{\tan(\theta - \beta)}{k_b}$ and $d_p / d$ depending on the angle $\theta^\circ$, for horizontal screen.

**Fig. 5.** The graphic representation of dimensions $K_a = \frac{r \cdot \omega^2}{g} = \frac{\tan(\theta - \beta)}{k_b}$ depending on the ratio $d_p / d$, for horizontal screen.

**Fig. 6.** Forces acting on up moving grain on screen.
Down sliding motion of the material on the screen

The forces acting upon the grain of material, when this is sliding down on the screen, are presented in figure 7.

![Figure 7. Forces acting upon the grain down moving on screen](image)

Proceeding as in the previous case, is determined the condition of grain downslanding on the screen:

\[ K_s = \frac{r \cdot \omega^2}{g} \geq \frac{\cos(\varphi - \gamma)}{\sin(\varphi - \beta)} \]  \hspace{1cm} (18)

The revolution of the crank for which condition (18) is fulfilled is:

\[ n \geq \frac{30}{\pi} \sqrt{\frac{g}{r} \frac{\sin(\varphi - \beta)}{\cos(\varphi - \gamma)}} \text{ rot/min} \]  \hspace{1cm} (19)

To prevent the grains to block the holes of screen, in both situations, it is necessary to be fulfilled condition (5).

The moving of grain with jumps on the screen [3, 5]

From the equation of formal equilibrium of forces, after the normal direction to screen, results:

\[ N = m \cdot \left( g \cdot \cos \beta - r \cdot \omega^2 \cdot \sin \gamma \right) \]  \hspace{1cm} (20)

The grain will detach from screen when its pressing on this becomes null, meaning:

\[ g \cdot \cos \beta - r \cdot \omega^2 \cdot \sin \gamma = 0 \]  \hspace{1cm} (21)

The condition (21) may be represented as:

\[ K_s = \frac{r \cdot \omega^2}{g} = \frac{\cos \beta}{\sin \gamma}, \]  \hspace{1cm} (22)

respectively:

\[ \frac{r \cdot \omega^2}{g} \cdot \frac{\sin \gamma}{\cos \beta} = 1 \]  \hspace{1cm} (23)

Parameter:

\[ C_s = \frac{r \cdot \omega^2}{g} \cdot \frac{\sin \gamma}{\cos \beta}, \]

representing the throw coefficient (the ratio between normal components at screen of the inertia force and of the grain weight) and characterizing the working condition of the screen with detach of the material from the sieve. The working condition with detaching of the material from the screen occurs for:

\[ C_s \geq 1. \]  \hspace{1cm} (24)

Using one of the relations (22) or (23) the revolution of mechanism connecting rod–crank for driving is:

\[ n \geq \frac{30}{\pi} \sqrt{\frac{g \cdot \cos \beta}{r \cdot \sin \gamma}} \text{ rot/min} \]  \hspace{1cm} (25)

The problem is how big can by the value of the throw coefficient, because when these values are growing, the oscillations of the screen become very energetic, with negative consequences, like: increasing of mechanical stressing of the component elements of the screen, as a result of the inertia forces; diminuation of quality of sieving (because of large jump of grains, which cross the screen more quickly).

The throw coefficient must have such a value so that the material passed through screening should be spared, the sieving quality should be adequate and the screen should be not bottomed by fixing of the “difficult” grains in holes.

A good quality of screening is realised when we touch the “statistical resonance”, meaning when the grain detach at every oscillation of the screen (the duration of the jump of grain is equal to period of oscillation of the screen), because in this case, the number of statistical comparisons between the size of grain and that holes of screen is the highest.

Should the grain jump in the the following holes, the height of jump of grain must accomlish the following condition (fig. 8) [1, 3]:

\[ h_s = \frac{v^2}{2 \cdot g} \frac{\sin \gamma \cdot \cos \alpha}{\cos \beta} \geq \frac{d + d_s}{2} \]  \hspace{1cm} (26)

where, \( d \) is dimension of the hole; \( d_s \) – diameter of screen wire from cloth (the thickness of the plate, for perforated screen plate); \( v \) – the speed with which the grain leaves the screen.

![Figure 8. Parameters of the grain jump](image)

If we consider that [3, 5]:

\[ v = r \cdot \omega \cdot \sqrt{\frac{1}{C_s^2} - \frac{1}{C_s^2 - 1}} \]  \hspace{1cm} (27)

in relationship (26), we obtian the screen speed in vibration movement:

\[ r \cdot \omega \geq \sqrt{g \cdot (d + d_s) \cdot C_s^2 - 1} \frac{\cos \beta}{\sin \gamma \cdot \cos \alpha} \]  \hspace{1cm} (28)

or the angular speed of the vibrator (the own pulsation of the disturbing force):

\[ \omega \geq \sqrt{\frac{g \cdot (d + d_s) \cdot C_s^2 - 1}{r^2} \frac{\cos \beta}{\sin \gamma \cdot \cos \alpha}} \]  \hspace{1cm} (29)

where \( \gamma = \alpha + \beta \) is the throwing angle.
Considering the expressions (23) and (27), the condition (26) becomes:

\[ h_s = \frac{r}{2} \cdot \frac{C_s^2 - 1}{C_o} \cos \alpha \geq \frac{d + d_s}{2} \quad (30) \]

The correlation (30) allows the determination of angle \( \alpha \):

\[ \alpha \leq \arccos \left( \frac{d + d_s}{r} \cdot \frac{C_s^2 - 1}{C_o^2} \right) \quad (31) \]

It is necessary to fulfill the following condition so that the grain should jump in the following hole (fig. 7) [3,5]:

\[ S_o = 2 \cdot \frac{\sqrt{g}}{g} \cdot \frac{\cos \gamma}{\cos \alpha \cdot \cos \beta} \geq d + d_s \quad (32) \]

where \( d + d_s \) is the step of holes; \( d \) – their dimensions; \( d_s \) – the diameter of the screen wire from cloth (the small bridge between the holes, for perforated screen).

Comparing the dimensions \( h_s \) and \( S_o \) determined by relation (26) and (32), we observe that :

\[ S_o = \frac{4 \cdot h_s}{\cos \beta} \quad (33) \]

The dimension of the angle \( \beta \) is constructive adopted observing the following specifications.

The screen is put in horizontal plane or inclined with an angle \( \beta \) relative to this. The angle \( \beta \) must be smaller than friction angle between material and screen (to keep the material to slide from the screen when this is not in function). More the \( \beta \) angle value is reduced, the better is the quality of screening, because in this situation, the length of grain jump is smaller and, consequently, bigger number of statistic comparisons between dimensions of grain and of the screen hole, during the time the material cross the screen and the angle of down fall of the grain on screen (leading to the increase of the probability of passing the grains through the screen holes).

The screens with big holes need high values for the amplitude of oscillation and of coefficient of throwing.

The amplitude of the oscillatory movement is adopted function of screen holes taking into consideration that screens with big holes need bigger amplitudes to realize a jump big enough which will assure the passing of grain from hole to hole. We recommend utilization of values from table 2 [3, 5].

The coefficient of throwing is an essential dimension for the correct function of the screen. The practical experience recommend the following values of the throwing coefficient for oscillating screen [3, 5]:

- \( C_s = 1.3...1.6 \) – for friable materials (which can break during the screening);
- \( C_s = 1.7...2.0 \) – for materials which are not breaking during the screening;
- \( C_s = 2.0...2.4 \) – for sticky materials, which have tendency to bottom the screen.

Knowing the values of throwing coefficient, the angular speed of the mechanism of driving crank gear is determined by relation:

\[ \omega = \sqrt{\frac{g \cdot \cos \beta}{r \cdot \sin \gamma}} \quad (34) \]

and revolution with relation:

\[ n = \frac{30}{\pi} \sqrt{\frac{g \cdot \cos \beta}{r \cdot \sin \gamma}} \quad \text{rot} / \text{min} \quad (35) \]

**Calculation exemple**

From a material with many dimensions must be obtained two fractions, by sifting. The separation dimension, the granulometric characteristics of material and the form of grains impose the adoption of a screen mesh with square holes STAS 1077 with opening of the hole \( d = 6.3 \) mm and the diameter of the wire of mesh \( d_s = 1.25 \) mm.

The material is not friable, but has the tendency to put a bottom to the screen by fixing the “difficult” grains in holes, so that we adopt the conditions of movement by jump, the throwing coefficient with size \( C_s = 2.2 \).

For the radius of the crank we adopt, depending on opening of holes \( d = 6.3 \) mm, value \( r = 5 \) mm (table 2).

It is obtained the value of angle \( \alpha \):

\[ \alpha = \arccos \left( \frac{d + d_s}{r} \cdot \frac{C_s}{C_o} \right) = \arccos \left( \frac{6.3 + 1.25}{5} \cdot \frac{2.2}{2.2} - 1 \right) = 30' \]

We adopt the value \( \alpha = 25' \).

For angle \( \beta \) we adopt \( \beta = 10' \).

The height of grain jump in the presence of screen is:

\[ h_s = \frac{r}{2} \cdot \frac{C_s^2 - 1}{C_o} \cdot \cos \alpha = \frac{5}{2} \cdot \frac{2.2}{2} \cdot 2.2 \cdot \cos 25' = 4 \text{ mm} \]

It is fulfilled the condition:

\[ h_s = 4 \text{ mm} > \frac{d + d_s}{2} = \frac{6.3 + 1.25}{2} = 3.7 \text{ mm} \]

The length of grain jump on screen:

\[ S_o = \frac{4 \cdot h_s}{\cos \beta} = \frac{4 \cdot 4}{\cos 10'} = 16.25 \text{ mm} \]

We observe that:

\[ S_o = 16.25 \text{ mm} \]

so the grain cross the screen jumping approximately, from two in two holes.

The angle of down fall of the grain in plane of the screen [3]:

\[ \varepsilon = \arctan (tg\alpha + tg\beta) - \beta = \arctan (tg 25' + tg 10') - 10' = 23' \]

To this value of the angle, the probability of passing through the screen of the “difficult” grains is reduced, but it is favoured the passing of little grains because of their knocking of the holes wires.

The revolution of crank, results:

\[ n = \frac{30}{\pi} \sqrt{\frac{g \cdot \cos \beta}{r \cdot \sin (\alpha + \beta)}} = \frac{30}{\pi} \sqrt{\frac{2.2 \cdot 9.81 \cdot \cos 10' - 0.005 \sin 25' + 10'}} = 822 \text{ rot} / \text{min} \]
The angular speed value of the vibrator for which the “difficult” grains unblock the holes of screen passing in following holes is:

\[
\omega = \sqrt{\frac{d + d'}{r} \cdot \frac{\cos \beta}{\cos \alpha}} \cdot \frac{C_2}{C_2 - 1} \cdot \frac{\sin \gamma}{\sin \gamma} = \sqrt{9.81 \cdot \frac{0.3 \cdot 1.25 \cdot 10^{-3}}{2.2^2} \cdot \frac{2.2^2 - \sin 35^\circ \cdot \cos 25^\circ}{2.2^2 - 1}} = 84 \text{ s}^{-1}
\]

to which corresponds the revolution:

\[
\omega = \frac{30}{\pi} \cdot \frac{30}{\pi} \cdot 84 = 300 \text{ rot / min}.
\]

We observe that the vibrator revolution determined by the coefficient of throwing (n=822 rot/min) assure the removing of “difficult” grains from the screen holes.

The period of screen oscillation:

\[
T = \frac{2 \cdot \pi}{\omega} = 2 \cdot \frac{30}{\pi} \cdot \frac{60}{60} = 0.073 \text{ s}
\]

The average speed of advance of refuse on the length of screen (determined from the reason that to each oscillation of the screen, the material advances in length of this with distance \(S_0\))

\[
y_n = \frac{S_0}{T} = \frac{16.25 \times 10^{-3}}{0.073} = 0.22 \text{ m / s}.
\]

The necessary revolution of the driving mechanism is:

\[
p \geq \frac{30}{\pi} \cdot \frac{\sin(\phi - \beta)}{\cos(\phi - \gamma)} = \frac{30}{\pi} \cdot \frac{9.81 \sin(22^\circ - 10^\circ)}{0.005 \cos(22^\circ - 35^\circ)} = 230 \text{ rot / min}.
\]

the angular speed:

\[
\omega = \frac{30}{\pi} - \frac{230}{30} = 24 \text{ s}^{-1}.
\]

For the work with shifting up on screen, the action revolution has the value:

\[
p \geq \frac{30}{\pi} \cdot \frac{\sin(\phi + \beta)}{\cos(\phi + \gamma)} = \frac{30}{\pi} \cdot \frac{9.81 \sin(22^\circ + 10^\circ)}{0.005 \cos(22^\circ + 35^\circ)} = 478 \text{ rot / min}.
\]

For the driving mechanism of the screen we adopt the revolution n=400 rot/min (\(\omega=42 \text{ s}^{-1}\)) to assure a convenient value of through-put capacity.

Considering that “difficult” grains have the dimension \(d_\beta = 1.15 \cdot d\), from the table 1 or figure 4, it results \(\theta = 60^\circ\).

The dynamic coefficient of the screen is:

\[
K_r = \frac{r \cdot \omega^2}{g} = \frac{0.005 \cdot 42^2}{9.81} = 0.9
\]

The blocking coefficient of holes has the values:

\[
k_\beta = \tan(\theta - \beta) = \tan(60^\circ - 10^\circ) = 1.19.
\]

The condition that grains should not block the screen holes, \(K_{\beta} \geq \tan(\theta - \beta)\), is not fulfilled.

From the condition:

\[
k_\beta = \tan(\theta - \beta) = K_{\beta} = 0.9 \text{ result: } \theta = 52^\circ.
\]

For this value of angle \(\theta\), from the table 1 or figure 4 result \(d_{\beta} / d = 1.27\). Consequently, at the function in these conditions of the screen, only grains with \(d_{\beta} \geq 1.27 \cdot d = 1.27 \cdot 6.3 = 8.0 \text{ mm}\) will not block the screen holes.

If the screen is horizontal, the others functional characteristics of the screen preserved, it results alternatively:

\[
k_\beta = \tan(\theta - \beta) = K_{\beta} = 0.9 \; ; \; \theta = 42^\circ; \; d_{\beta} / d = 1.46.
\]

Then, for the functioning of the screen in these conditions, only grains with \(d_{\beta} \geq 1.46 \cdot d = 1.46 \cdot 6.3 = 9.2 \text{ mm}\) will not block the screen holes.

We can observe that the inclination of the screen face to horizontal, reduces the tendency of grains to obturate the screen holes.

When the technological conditions allow it is recommend the function of the screen in conditions of jump grains on screen which is advantageous to avoid the blocking of the screen with “difficult” grains.

Conclusions

The sieving process is influenced both by the friction between material and screen and by the obturation of the holes of screen by blocking the grains. The friction influences especially shifting by sliding of the material on the screen.

While the sifting, some grains, depending on the ratio between their dimensions and that of screen holes, fixed in these obstructing the screen and, consequently, perturbing the process.

More the dimensions of the grains are close to those of the holes, the stronger is the phenomenon of fixing the grain, in the screen holes, requiring to unblock them higher accelerations of the screen. The phenomenon of blocking of screen holes is diminished with the increasing of the inclination of screen relative to of horizontal plane.

When the technological conditions allow, we prefer the work of screen in condition of jump of the grains on screen, which is advantageous, between others, also because it avoids the blocking of the screen with “difficult grain”.

References

1. JINESCU, V. V., Utilaj tehnologic pentru industrii de proces, vol. IV, Editura Tehnicã, Bucureºti, 1989
4. ENE, Gh.,Determinarea coeficientului de frecare dintre materialele granulare ºi sitele din ³sãturã, Revista de Construcþii, 1995, p. 43
5. ENE, Gh.,Studiu privind miºcarea cu salturi a materialului pe sita ºi sitele din þesãturã, Revista de Construcþii, 1995, p. 43
7. IATAN R., Consideraþii teoretice cu privire la ciuruirea prin alunecare ºi ciuruirea prin alunecare pe sita cu ochiuri circulare ºi pãtrate, Rev. Chim. (Bucharest), 52, nr. 7- 8, 2001, p. 420