Some basic factors affecting screen performance in horizontal vibrating screens

K.G. Tsakalakis, Assistant Professor NTUA
E-mail: kostsakg@metal.ntua.gr
National Technical University of Athens, Greece
Presented at the Minerals Engineering 2000 conference held in November 2000 in Cape Town (South Africa)
Abstract

- The **objective of the work** was the study of some basic factors affecting the performance of the horizontal vibrating screens.
- The **main objective** was the determination of the optimum operational conditions for the horizontal vibrating screens.
- The **study was focused** on the basic factors that affect screening efficiency $E$ (cumulative undersize recovery), under constant feed rate for each screen aperture.
The factors examined were:

- The intensity of vibration \(2\varepsilon_v\)
- The percentages of the characteristic size-fractions (critical size, critical undersize and oversize, half-size and oversize material) in the feed
- The screen length \(L\)
- The size of the screen aperture \(a\) in conjunction with the above mentioned factors.
Results and Conclusions

- The screening efficiency $E$ increases asymptotically with the screen length $L$ and the relationship between them was found to be:
  
  $$E = 1 - \exp\left(-\frac{L}{AL+B}\right) \quad (0 < E < 1)$$
  
  where, $A$ and $B$ parameters ($B > 0$), depending on the screen aperture $a$ and the intensity of vibration ($2\varepsilon v$).

- **Increasing** the intensity of vibration, **increases** the screening **efficiency** $E$ for screen length less than $L/2$.

- For screen apertures 2.0 mm (feed size -4.0 mm), 1.0 mm (feed size -2.36 mm) and 0.6 mm (feed size -1.4 mm) the **most important factor** determining the efficiency $E$ is the vibration frequency $v$, while for the screen aperture of 4.0 mm (feed size -9.5 mm), are the frequency and also the amplitude ($2\varepsilon$).

- The percentage of the critical oversize (particles of size $a < d < 1.41a$) in the feed is **more important** for the efficiency $E$ than that of the **critical undersize** ($0.71a < d < a$).

- **Reduction** of the critical size material in the feed **improves** the efficiency $E$ more drastically with coarse screen apertures than with fine ones.

- For coarse screen apertures the **reduction** of the critical oversize of the feed **improves significantly** the efficiency $E$, while for fine apertures the improvement is negligible.