



Press release MIM – Ore crushing

The new “basics“ of ore crushing

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Efficiently grinding ore-bearing rock – that is the core business of breakers and mills. For decades now, the particle size of rock has been reduced purely mechanically with these huge machines. This is completely different to the Micro Impact method: here the material in the mill “pulverises“ itself, and this means enormous advantages in ore crushing. This innovative Micro Impact Mill amortises quickly because it combines energy efficiency with resource efficiency and offers the industry at the same time a completely new man-machine cooperation, completely without silicosis and noise-induced hearing loss.

Traditionally, until today the processing of ores takes place in four steps. Several breakers, set in sequence, grind the mined ore to a certain particle size, and then these are further ground in mills, mostly ball mills, with a wet-mechanical procedure. The so generated, pumpable suspension is classified or segmented into different grain categories. The final step for the processing of the ore-bearing rock is the floating, a physical-chemical step where in water the ore-bearing metal is transported to the water surface through adhering gas bubbles and is skimmed there. The final product is then the ore concentrate.

In mining, these large crushing machines are the advance step for ore processing. Depending on the country, region, yield and size of the mine, some dry-working breaker types and a subsequent mill including transport and screening systems form the chain of ore crushing. With the traditional devices, the size of the plant, the energy and logistics effort for the rock material as well as the dust pollution of the environment are tremendous.

Ore crushing in comparison

The crushing principle of a jaw breaker for example only works with mechanically generated pressure. The comminution of the crushed material usually takes place in a wedge-shaped shaft between a fixed and a moving, off-centre jaw breaker. During the movement, the rock material is crushed so long until the material is smaller than the pre-set crush gap.

The procedure in a ball mill is more refined: In ball mills, the ore-bearing rock that usually has been previously broken up, now grinds together with iron balls within a drum that is put into rotation. The mill material here is “squeezed” by the balls, and



this leads to the particle comminution. Including the abrasion of the mill balls, that additionally contaminated the crushed ore with the iron from the iron balls.

The Micro Impact Mill uses a completely different comminution method. Here the rock in the milling area is exposed to very high acceleration energy and momentum, and this leads to stone colliding with stone and single grain colliding with single grain according to the chaos principle. Due to self-collision, there is a break in the material itself – without the utilisation of mill mechanics or grinding elements. There cannot be any wear and tear, since the exchange of the iron balls in the ball mills can cost the company a fortune.

Quantum leap in ore mining

With this innovative mill, in ore processing a new era for crushing machines can start: In comparison with traditional crushing systems, the Micro Impact Mill represents a cost-optimised procedure with higher effectiveness that acts in a much more energy-efficient and at the same time more environmentally-friendly way. Two of the most common reasons for occupational diseases in mining – noise and dust – are a thing of the past with the Micro Impact Mill. In harmony with the tendency towards optimised man-machine cooperation, because the health of the operators benefits from the fact that noise-induced hearing loss and silicosis are no longer topics that deteriorate work conditions.

What is remarkable is the energy reduction that has been achieved, which is no less than 80%. Usually, the performance value for a classical process with breakers and mills is about 750 kW; the Micro Impact Mill needs a mere 35 kW with low initial current values. Noise measurements in operation show a value of 80 dB, whereas with the breakers 130 dB is the rule. The high efficiency of the system can also be seen in the high output of 55 t/h. And this with the small dimensions of the prototype. Variations in the technical design of the Micro Impact Mill offer further process improvements concerning mill material quality and output increase.

Wet and/ or dry: both processes function without any problem in the Micro Impact Mill. When adding some water, the mill material quality can be even more refined. If we consider the cost-effectiveness of this mill, this comminution system can replace the traditional sequence of breakers and ball mills. A shorter process of this kind will simplify logistics considerably. After a period of four seconds per filling, there are grain sizes of a diameter up to 300 µm. Almost half of the milled rock can be directly further processed to floating.

Ecology and sustainability

The efficient mining of resources is getting more and more attention, especially regarding sustainability and environmental protection. With this Micro Impact Mill,



MIM Ltd. presents a “ball mill without balls” which is able to completely redefine the whole process of ore crushing. Traditional crushing systems – consisting of several breakers and ball mills – are clearly inferior to the Micro Impact Mill when considering the quantitative and qualitative yield.

The ore yield speaks in favour of a pure resource efficiency which opens up completely new potential, for example for mines that have already been closed down. In combination with the aspects of environmental protection, it is the human being that benefits most from the Micro Impact method, because the two primary occupational diseases in mining – noise-induced hearing loss and silicosis – retreat fully into the background. With this technology, mining can be revolutionised without any ball mills and breakers. Visions with this mill point into the right direction towards sustainable mining, which protects man and environment and takes care of the ever increasing scarcity of resources.

www.micro-impact-mill.com

Caption of the image:

How ore material will be crushed in the future. The Micro Impact Mill is far more than an alternative to a ball mill.