



Press release MIM Ltd. – Product description

A ball mill without balls

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The Micro Impact Mill possesses all attributes to revolutionise mining and/ or ore crushing. Especially in the interaction between technical change and the demand for resources, this comminution method represents a future-oriented solution which can be compared to the innovation leap in aviation, when the drive changed from propeller to jet propulsion. Faster, higher, further now can be translated into more efficient, healthier and easier.

According to the Fraunhofer Institute, in 2050 human mankind will consume 140 billion tons of minerals, ores, fossil fuels and biomass per year. Nowadays we consume one third of this. Resources will become the key in global competition, especially for mining. “Minimising the energy and resources consumption” is the motto for industry. Energy-efficient innovations are one step towards the saving of resources and at the same time an opportunity to change the economy and set sustainable signals.

As a high-tech industry, mining plays a strategic role in the production of raw materials. Improvements of the technical process are the first step towards more resource utilisation rather than resource consumption. That energy is also saved by using a micro impact effect, and at the same time the environment is better protected, shows the real potential that the Micro Impact Mill can offer.

Ore crushing is re-defined

Nowadays systems consist of breakers that grind the metalliferous ore-bearing rock in a dry state. Ball mills grind the ore in a wet procedure with iron balls in a rotating grinding cylinder, until the desired degree of powder fineness has been achieved in the ball mill. The operating costs of these huge, heavy machines and their energy consumption are enormous. Extremely high initial currents are only one consequence that can lead to high penalties from the energy suppliers. Additionally, both the balls as well as the grinding cylinder wear off so that it is only a matter of time that service and repair are needed. Wear, abrasion and frequent utilisation of the iron balls as well as expensive changeover times put a further burden on the operating costs.

When considering the degree of efficiency, the Micro Impact Mill shows its effectiveness: not mechanical drives crush the ore but the material pulverises itself. And this means a drastic reduction of energy consumption. Current measurements with comparable machine sizes show saving potentials of up to 80%, and the output of the ore-bearing rock is higher with the Micro Impact Mill than the cumulative value



of breaker plus ball mill. And not even to mention the short work time of one mill run and its resulting mill material quality.

In this context, it is also important to mention that the process is independent of water. The Micro Impact Mill works both dry and wet – an advantage, because the process chain of breakers and mills has to differentiate this due to the function. Furthermore, the Micro Impact Mill also grinds slag or a mixture of slag and ore material, which overburdens the comminution technology of traditional systems due to the hardness of the material.

If you now compare today's comminution sequence of several breakers and ball mills, this single procedure now makes the advance grinding process of the material unnecessary. Several advance processes for the partial grinding of the material – for example with jaw crushers – now become redundant. The idea that one Micro Impact Mill can replace a series of breakers and mill “can move mountains”.

The Micro Impact effect in the mill

If we have a look into this mill, we can see two sheaves that function as accelerator and bluff body for the ore to be ground. Adjustable rotation options of the driven sheaves generate very high relative velocities of the rock with the help of special driving pin elements. In the intermediate area, there is a wild collision of the individual materials. Ore material collides with ore material directly and through this Micro Impact effect, a reciprocal comminution and pulverisation of the material takes place.

Thanks to this innovative Micro Impact method, the grinding takes place much faster than with only the mechanical grinding method with breakers and ball mills. This unique feature of the mill is the reason why the material pulverises itself with uncountable self-collisions.

If we consider in detail the run of the stones in the Micro Impact Mill, then the rock first gets into the machine via a feed hopper. Through an opening in the fixed sheave, the material enters the intermediate area and the driving sheave accelerates the rock material. Driving pin elements are integrated in the geometry of the sheave that bring the fed-in ore-bearing rock into radial speed. With the acceleration energy taken up, the stones collide with each other and this leads to a highly efficient pulverisation of the mill material.

This Micro Impact is based on the fact that the mill material accelerates due to the relative movement of the jaws and due to the tightness of the intermediate area, the grinding takes place in very fast time intervals. The driving pin elements on the sheaves ensure the high velocities in radial as well as axial direction, so that then the generated powder is pressed out of the intermediate area and is transported out of the machine via an outlet hopper as powder to be further processed.



The degree of pulverisation – or rather the grain size – is mostly determined by the distance of the two sheaves. The smaller the distance, the finer the grain size. By adding some water, the work process in the mill can be further shortened. The operators thus have several setting parameters for required grain sizes – and this without any dust exposure.

Industrial revolution in mining

Regarding the quantitative and qualitative yield, traditional comminution systems consisting of several breakers and ball mills are clearly inferior to the Micro Impact Mill. The process costs show the difference: up to 80 % higher energy efficiency and quantum leaps for an improved working environment in mining underline the innovation in ore crushing, which also does not disregard the aspects of environmental protection and the saving of resources.

Within the working environment of the Micro Impact Mill it is above all the human being that profits: noise and dust pollution in the direct vicinity of the machine do hardly occur any longer. A fact that makes world-wide mining more climate-friendly, healthier and more careful about resources. The Micro Impact Mill shows advantages in mechanical engineering whose potential for mining will be enormous. Principally, this innovative mill is a revolutionary further development of the ball mill – just without balls. No balls, no wear and tear. In comparison, the Micro Impact Mill appears considerably lighter, easier and more efficient. Thus it virtually provokes its utilisation in sustainable mining.

www.micro-impact-mill.com

Caption for image:

Collective collision in a ball mill without balls: In the Micro Impact Mill, the ore-containing rock grinds itself.