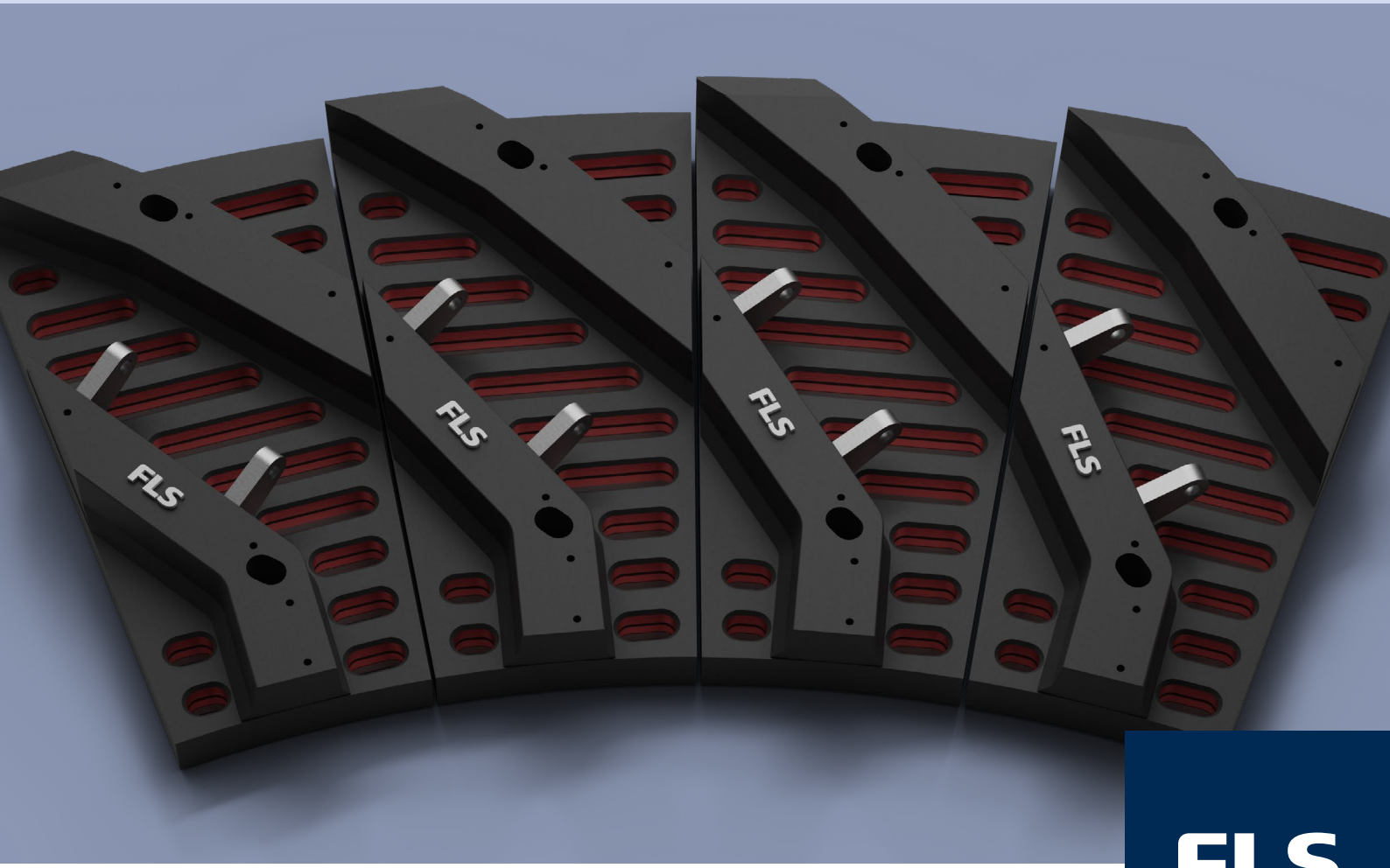
Composite Discharge Grates

Our self-cleaning, next generation composite grates solves the failures of steel



Mission Zero Towards zero emissions by 2030

FLS

Our Solution: Self-Cleaning Grates

FLS has developed a composite grate that has been shown to give very good results and provides solutions to the key problems faced by SAG customers.

Our next generation composite grates are made of laminated steel that is practically twice the hardness of traditional steel with a material that is highly resistant to wear and impact. This type of steel is used, for example, in tanks and bridges and, due to its chemical composition and lamination process, allows for high resistance to wear and impact. Composite Discharge Grates are designed for various design options that includes Helical, Radial and S type.

They are made of a combination of steel with rubber which allows it to be self-unblocking and ensures that the openings are not clogged with the steel balls of the SAG mill. In addition, the design is interchangeable and being a combination of steel with rubber it can be up to half the weight of a cast grates.

Traditional grates are made of a less hard cast steel to avoid a brittle metal and thus avoid premature breakage. It must be remembered that the geometry of the grates means that, when impacted by the metal balls inside the SAG mill, they are highly exposed to breakage or damage to the grates.

Furthermore, since the cast grates are made of a material between 250 and 300 Brinell hardness (soft compared to the rest of the steel lining) it means that it is very ductile and therefore the openings are many times greatly deformed.

The Problem with Traditional Steel Grates

SAG mill grates are generally the most complicated element of the mill liner assembly. It must be considered that it is a piece that by its nature is very complicated since it is a piece that has openings with ribs between openings to be able to classify the finest mineral so that it can be evacuated from the mill. We could say that the grates work as a sieve allowing the minerals and the evacuation of the SAG grinding chamber.

In other words, the grates are often the mill bottleneck and many times it is due to failures in the grates that the mill must be stopped to change or uncover them.

The main failures in steel grates can be mentioned as follows:

- Cracks of the grates
- Plugging of openings
- Deformation of the openings
- Accelerated wear of the grates

Key Benefits

100% developed to prevent balls obstruction

Our Composite Discharge Grates are designed with a combination of rubber and laminated, high strength and high wear resistant steel. This combination of materials and our innovative design means that we can warrantee that there will be much less balls obstructions.

Some mines have to shut down the SAG mill in order to clean out the traditional steel grates if they are too obstructed. This can mean several hours per year with reduced availability and total production.

No blinding on the grate's slots

A unique design has been developed together with the university and has been tested in Industrial and on large SAG mills in order to secure there will be no blinding of the SAG grates.

No peening in between the grates

The normal steel grates that are used in the industry are made of casts chrome moly steel that have a reduced hardness of between 250 and 300 Brinell hardness.

This material is very ductile, and therefore this can cause that after some weeks of operation, there can be the deformations on the slots.

We have seen examples of steel grates that have started with an opening of 3 inches, and that can be reduced to 1.5 inches. Half the normal slot opening.

This can cause serious operational problems with reduced throughput and high-power consumption

Reduce total weight inside the mill

Thanks to the innovative design of our Composite Discharge Grates and the use of stronger material, we are able to reduce the total weight of up to 50% less compared to normal steel grates.

Today, one of the objectives in the mining industry is to reduce the weight of the liners, and therefore reduce power consumption and energy consumption. And also a reduced weight means longer life of the SAG mill.

Increase wear life

Thanks to the laminated high wear resistant steel that we are using in our grates, we have seen up to 50% higher wear life compared to normal cast grates.

Today, one of the critical, wear life and mostly what defines the shut down intervals is depending on the SAG grates.

With a longer wear life, this means that you can reduce the amount of shut down per year, and therefore increase the availability of the SAG mill and increase the annual tonnage of the plant.

No breakage problems

We have seen that most of the unplanned shut down during a year is due to grates breaking.

We have to consider that grates by its nature, is a very complicated geometry and we also have to consider the working condition with steel balls of up to 6½ inch diameter. This causes a high probability of breaking the grates.

If you have a broken grate, this means that you need to shut down the SAG mill from 4 to 8 hours just to replace one single grate. Considering that the hourly cost is between US$100K and US$200K per hour this can mean up to $1.6 million usd per shut down.

Better throughput

When you have peening and/or blinding on the steel grates, this means that you have a reduced throughput during this period. This sometimes happens in the beginning of the wear life of the grates, and in some mills, you have this problem at the end of the campaign.

This can cause up to 5-15% reduction in throughput due to that there is no possibility for the fine ore to pass through the SAG mill.

Faster installation

Thanks to the reduced weight, the installation is faster compared to normal steel grates. You will have no need for torching that sometimes is a problem when removing the steel grates normally used in mining operations.

Follow us here


flsmidth.com/linkedin


flsmidth.com/twitter


flsmidth.com/facebook


flsmidth.com/instagram


flsmidth.com/youtube

M 02-24 1000-18-EN

Contact us

FLSmidth A/S
2500 Valby
Denmark
Tel. +45 36 18 10 00
info@flsmidth.com

FLSmidth Inc
Salt Lake City Operations
Midvale, UT 84047-5559
USA
Tel. +1 801 871 7000
info.slc@flsmidth.com

flsmidth.eco/contact

FLS

Mission Zero Towards zero emissions by 2030