# Massive scalping screen engineered for tonnage

*Engineering vibrating screens and feeders requires an in-depth understanding of the nature of the application. Gunter Vogel, Chairman of Joest South Africa, says that it is critical with screens and feeders to ensure that forces are directed through sections of the structure and components that are sufficiently strong to handle them.*

Kenny Mayhew-Ridgers, General Manager Engineering at Joest South Africa.

In addition, he emphasises that it is important to ensure that for screens and feeders the centrifugal forces generated are directed evenly along the designed drive angle, near or through the centre of gravity. "This ensures that the machines run symmetrically along the longitudinal axis. In this way the material will be carried across the feed deck of the screen or feeder in a steady and even motion, providing effective screening," he says.

Kenny Mayhew-Ridgers, General Manager Engineering at Joest South Africa, states that screens should not be merely an add-on in a processing plant flowsheet. It is critical that these sometimes very large items of equipment are integrated during the design stages of the project and that all aspects of downstream and upstream processes are factored in to guarantee fit-for-purpose screens. "This is the only way to ensure that a screen is engineered for the required tonnage," he adds.

Scalping or run-of-mine screens are typically the first step in screening Run-Of-Mine (ROM) material in the extractive metallurgical process on a mine. These machines are often required to separate large boulders from vast amounts of smaller material for recrushing.

*Joest scalping or run-of-mine screens are typically the first step in screening ROM material in the extractive metallurgical process on a mine.*

Joest South Africa produced its first scalping screens during the 1970s and has built a substantial footprint of scalping screens throughout Africa, with the majority of the mines in the Northern Cape operating with some or all types of Joest screens. The biggest scalping screen manufactured to date by Joest South Africa is 3,7 m by 10,2 m and is driven by three of the largest exciter gearboxes which generate a centrifugal force of in excess of 2 MN (meganewton).

"Due to be installed on an iron ore mine, this ROM screen may not be Joest South Africa's largest screen in terms of its dimensions, but it is certainly the heaviest, weighing in at over 50 tons," says Mayhew-Ridgers.

Joest South Africa received this significant order to re-engineer, manufacture and commission what is one of the largest screens ever produced to date for a mine in the Northern Cape. The scalping screen is required to handle variable ore conditions with a continuous feed load of a maximum of 6 000 t/h plus a 15 % higher surge capacity.

Mayhew-Ridgers points out that the feed material from the mine is supplied

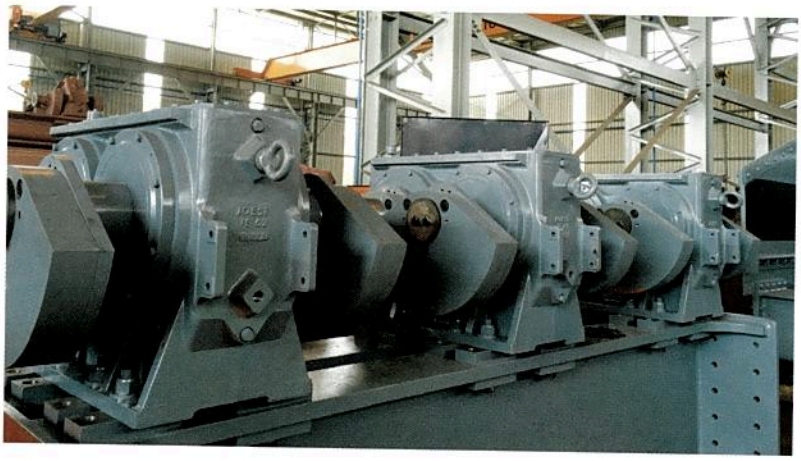
to the primary crusher and the crusher product has a top size of 400 mm. This product will be fed to the scalping screen to remove the minus 90 mm material and the oversize material will then be fed to the secondary crusher. The crushed material from the secondary crusher will then be added to the undersize minus 90 mm material for further processing.

The engineering scope for this project entailed the design of a robust 50-ton screen that would offer extended wear life. In addition, the screen needs to be able to cope with 30 % more deck loading as a result of changes in the downstream processes as well as screen operating conditions. The mass of the scalping screen had to be limited as the output of the exciter gearbox has a physical limit of centrifugal force.

"Joest manufactures its own exciters and currently offers the highest centrifugal force available of any exciter gearbox manufacturer in South Africa. Three of our largest exciter gearboxes have been used to jointly produce the centrifugal force required for the total mass of this screen," says Mayhew-Ridgers.

Vogel explains that because the application is for an open-pit mine, the screen must deal with three different types of particle distributions. "In the first cut there may be large amounts of overburden mixed with the material, which means there is a much lighter type of material, with a light bulk and SG (Specific Gravity) density. The medium range of material tends to contain more iron ore, while the coarse fraction generated from the drill and blast operation is much larger with boulders, sometimes over a metre in one dimension. After passing through the primary crusher, this ROM material fraction is generally reduced to minus 400 mm and is then sent to the scalping screen."

The scalping screen deck is engineered to withstand the gruelling pounding of the feed which will tumble down from wide feed chutes onto the screen deck. During the screening operation, the screen deck will lift and fall by 12 to 14 mm around 800 times per minute. This generates enormous forces that have to be taken up by the screen body and its component parts.



*Joest's large exciter gearboxes that will drive the massive scalping screen.*

Furthermore, the screen design, amplitude of stroke, excitation force and screen deck selection have been optimised to limit pegging during the screening operation. Joest selected steel reinforced rubber screen panels for this scalping screen based on the resilience of the panel and its ability to absorb the centrifugal forces placed on the screen and especially on the screen deck during operation.

Screen development is an ongoing process and Joest South Africa opens its doors to industry in terms of collaboration. The company has a number of examples of how access to information can make a difference to the overall engineering of a screen.

"If material is incorrectly fed onto a screen, then the design of the screen has to compensate for this factor. It is this in-depth understanding of downstream and upstream processes, as well as our understanding of the limitations in a given flowsheet, that give us our major competitive advantage. Staying abreast of wear technology allows the company to assess all available options and then select the most appropriate solution," Vogel concludes. ■

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