# IN TRANSIT

***Ian Laws, Joest Australia Pty Ltd, Australia, considers advances in design methods for vibrating screens used in coal processing.***

Vibrating systems have been Joest's core capability for more than eighty years. Developing the optimum combination of vibratory drive systems and machines can provide the basis for practice proven solutions, whilst continuous R&D enables the company to adapt to the increased demands of industries throughout the world.

Whilst Joest vibrating equipment has been manufactured in Australia under a licensed agreement for 17 years, Joest Australia commenced its own operations in Australia in 2001, with the head office based in Welshpool, Western Australia. This has been ideal for providing the company's service to the fast growing mining industry in this region.

Since commencing Australian operations, Joest machines, including large banana screens, grizzly screens and trough feeders, have been supplied to mining, quarrying and foundry applications within Australia and the region. Recently Joest Australia made its first export to China of two large double deck vibrating screens to handle raw coal for a green new coal mining project in the Shaanxi Province of China.


*Joest model SRZN 4270 x 7320 screen on test in Perth, western Australia.*

These are amongst the largest vibrating screens built to date. This has only been possible due to advances in sophisticated design tools like finite element analysis (FEA) technologies, which are now available to the engineers. The Chinese design

institute selected Joest screens based on its need for very wide machines to suit the application.

The screens are 4.27 m wide by 7.32 m long, making them the largest built by the company to date. They weigh 32.2 t excluding the isolation frame. The use of the isolation frame improves the isolation efficiency of the support system, thereby reducing the dynamic loads transmitted into the supporting superstructure.

Each vibrating screen will handle 1000 tph (dry) of raw coal that is < 400 mm in size with a bulk density of 0.9 t/m$^3$ and a moisture content of up to 10%. The selection of the screen media required to handle this moist material was critical to the operation and special 'flexible' polyurethane screen panels have been provided for the lower deck.

The vibrating screens are equipped with two of the company's JVM model JR1008 exciters, the largest in the JVM range, each having a working moment of 20,400 kgcm. These large exciters weigh 2.5 t each and provide excitation of the screen via a specially designed drive beam.

The multi-slope (Banana) deck surfaces are arranged with the first deck stage at a 25° decline and the second deck stage at a 15° decline, providing high material velocity at the first stage to achieve 'thin bed' screening. The selection of deck angles, stroke and frequency is based on imparting optimum vertical acceleration to the material to provide high capacity and efficient screening.

The use of the latest FEA methods has enabled Joest engineers in Germany to design very large vibrating screens by being able to accurately model stress levels in critical components of the vibrating screen. This better understanding of the stress levels and natural frequencies of the machine enable the engineers to push the boundaries of designing large machines.

The screens were manufactured in Perth, western Australia and were fully assembled for factory acceptance testing in accordance with the company's standard protocols.

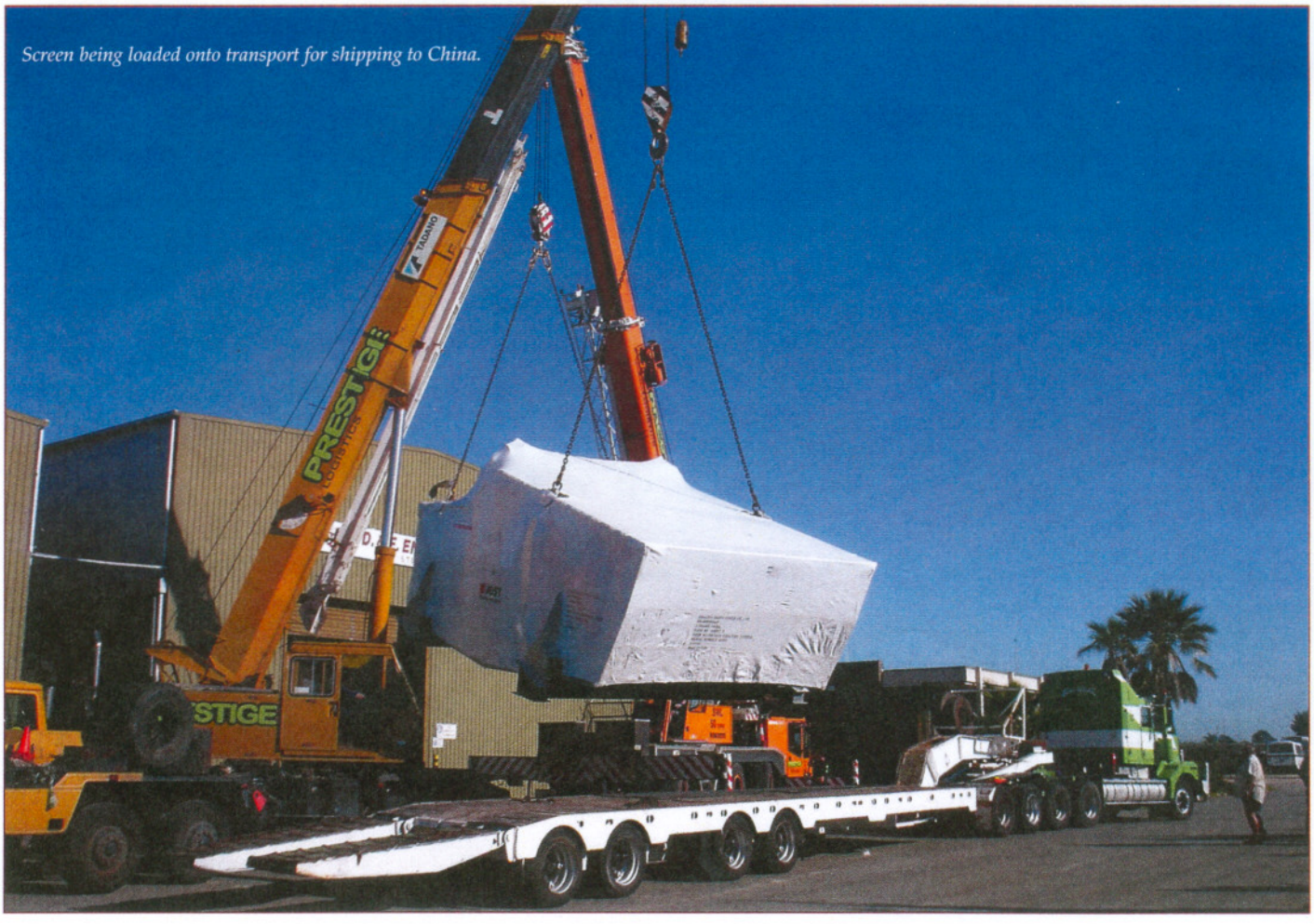
Joest's investment in FEA methods has proven valuable in the development of large vibrating screens and will enable further advances in the design of large vibrating machines and advancing the technology that is used in the mining industry throughout the world.

The screens have been designed to accept 'snap in' modular panels, screen deck surfaces, an abrasive resistant plate top deck with 50 mm hexagonal apertures and a 'Elastoflex' polyurethane bottom deck system with 13 mm square apertures. The highly flexible lower deck screen surface reduces blinding and pegging, ensuring that the screen surface remains open, therefore enhancing screening performance. The 'snap in' modular panel systems make replacement safe, easy and quick, increasing equipment availability and utilisation.

When vibrating screens of this size were shipped the process presented many challenges because the oversize transport dimensions were 5.29 m wide x 8.95 m long x 4.1 m high. Special transport beams were designed and supplied to support the machines during road transport and whilst on the ship. The vibrating screens were 'shrink wrapped' to protect them from the elements whilst in transit.

## Conclusion

Follow up orders for vibrating machines have been received and Joest hopes to further the development of its market share in China through established supply lines. ■




*Screen being loaded onto transport for shipping to China.*