

# Goin' Underground

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## Changing Methods of Sinking Vertical Shafts in Mining

By Natasha Odendaal

**T**he way the mining industry and contractors work with vertical shafts is changing through the introduction of technologies such as Murray & Roberts (M&R) Cementation's advanced shaft-lining technology.

"Currently, the mining industry is discussing options for safer methods of sinking vertical shafts and the changes needed to eliminate parallel activities in a vertical shaft," says M&R Cementation Business Development Executive Allan Widlake. The company believes the lining technology will bring about significant change in shaft sinking.

The shaft-liner machine remotely shotcretes lining from the top to the bottom of the shaft, up to a depth of 492 ft (150 m), within 7 days.

"As there is no need for any personnel to descend into the shaft at any time during the process, this makes this shaft-lining system safer than the conventional methods used," says Widlake.

This is echoed by M&R Cementation Senior Project Manager Pat Muller: "The remotely operated shotcrete system eliminates the risky, costly, and time-consuming process of lowering employees and equipment down the shaft to apply the lining."

The shaft liner can be adjusted to accommodate shaft diameters from 4.9 to 26.25 ft (1.5 to 8 m) by attaching different leg attachments to the spray head. The process takes place at a rate of 317.8 ft<sup>3</sup> (9 m<sup>3</sup>) in a 12-hour shift.

Progress can be observed through cameras mounted on the spray head, enabling operators to verify the quality and process of spraying for the client's and the contractor's records.

"The system requires two operators who have full control of all functions during the scanning and spraying process, such as the hydraulic pump, winch speed, rotation speed, drycrete feed rate, addition of air and water, and recorded DVD footage," says Muller.

At the end of the process, a detailed report is generated as proof that all the required specifications have been met.

"The remote shaft-liner shotcretes safely, cost effectively, and on time, providing a high-quality finish," Muller says.

The system is mobile and is transported to the required location using a 7- to 10-ton truck.

### Testing Technology

The shaft-liner technology will be employed for the first time in Botswana during a turnkey contract, secured in November by M&R Cementation, to raise-drill and support two 19.7 ft (6 m) diameter vertical shafts, which will be sunk to a depth of 361 ft (110 m) at Debswana's Morupule colliery.

The scope of work includes the project management of the commissioning, manufacture, supply, and installation of two 1 MW fans in the upcast shaft and is expected to be completed by June.

The Morupule colliery supplies coal to the Morupule Power Station, and this contract forms part of the current expansion program, which will increase capacity from 1 to 3 million tons a year.

