



Zambia's Mines

# One of deepest copper mines nears completion in Mufulira

*It will be 2 km in depth and bristles with ultramodern technology*

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**Y**ou know you have one of the world's most sophisticated underground copper mines when people from as far afield as Germany and Switzerland come to visit it and walk away impressed.

"Foreign visitors can't believe that an African country has this level of technology," says Kevin Erasmus, a manager on the project. "We've even had representatives from the Association of Mine Resident Engineers of South Africa and the Mine Managers of South Africa here, and they say they've never seen stuff like this in their lives. It's like – wow!"

Mufulira Deeps is a brand-new shaft estimated at US\$277 million that Mopani Copper Mines is constructing in the town of Mufulira, on the Copperbelt. It will add 25 years to the life of the mine. Work started in 2013, and it has already reached a depth of 1.5 km.

The shaft is being sunk using a more efficient technology known as raise-boring: instead of drilling vertically downwards from the surface, the drilling is done upwards from underground.

**Experts from as far afield as Switzerland and Germany have come to visit the project**

By the time the shaft reaches its design depth of 2 km, Mufulira Deeps will be the world's second deepest, single-shaft underground copper mine, a shade behind the 2.1km-deep Resolution Copper Mine in the state of Arizona, USA. At such depths, the ambient temperature is 48 °C – hot enough to cause heatstroke and death within hours.

A massive Bulk Air Cooling system has been installed that sends refrigerated air down into the shaft, and brings the ambient air temperature below to between 29 and 31 °C. "It's more manageable, but it's still basically summer down there," says Erasmus.

Mufulira Deeps' technology is ground-breaking. The mine will be able to hoist 10 000 tonnes of copper ore to the surface every day, in a lift travelling at 18 metres per second. That's six times faster than an average commercial office lift, and nearly twice as fast as the ultra-rapid passenger lift in the Burj Khalifa, the world's tallest building, in Dubai.

When the headgear – the giant steel and concrete structure that towers atop the shaft – is complete, it will rise nearly 80 metres into the air. It will be Zambia's tallest headgear, and the highest free-standing structure in Mufulira and the surrounding area.

"It's all about productivity," says Erasmus. "Mufulira Deeps will do everything faster, more efficiently, more safely and with less handling."



The construction site is a hive of activity, and mobilises more than 600 Zambian and international workers around the clock. At the centre of things, unmissable by virtue of its yellow colour, is a massive mobile crane, made by the German company Liebherr. It sits on caterpillar tracks, towers as high as 100 metres and can lift loads of up to 400 tonnes. The crane will be used to construct the headgear and lift the heavy steel components, equipment and machinery down into the shaft.

The ground upon which the crane sits has been specially strengthened to take its weight. Patrick Akayombokwa, project engineering superintendent, explains: "The concrete surface we're standing on is more than a metre deep, with multiple layers of steel reinforcement. It allows the crane to be stable and move around without toppling over."

Perhaps the most awe-inspiring sight at Mufulira Deeps is the winder house, which houses the massive winder drums and cables that hoist both the miners and the copper ore from underground. The two drums are 5.7 metres in diameter, three times the height of the average human being; the steel rope that runs around each is just over 5 cm thick; and the shaft that connects the two drums weighs 52 tonnes and is wider than a big tree trunk.

Bernd Sinner, the winder engineer responsible for the installation, highlights the international nature of the entire set-up. "The motors were made in Canada; the drums were manufactured in South Africa; the hydraulics are from the UK; the Hooke's coupling was made in Germany; and the drum shafts were cut in Korea and Japan. The logistics of the whole operation were staggering: it was all shipped to Durban in South Africa and Walvis Bay in Namibia, and brought to Zambia by road."

The entire set-up is electronically controlled, runs automatically, and can be controlled remotely via a computer – or even an iPhone. "This is absolutely the latest technology in hoisting anywhere in the world," Sinner says emphatically.

For Mopani, perhaps the most satisfying aspect of the entire project is that it has been underpinned by a systematic skills transfer and learning programme, and Zambians have been involved at every stage. Consequently, the next time something like this needs to be built in Zambia, it will be able to be done with minimal international assistance.

**See also:** [Cautious sense of optimism at Mopani](#)

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