KCM is the largest mining and metals company in Zambia with annual capacity of 200,000 t of copper. Soon it will grow to even greater stature with its Konkola Deep Mining Project (KDMP), which involves the continuation of mining below the current depth at Konkola mine and simultaneously expanding the production of copper ore from 2 to 6 Mt/y. It will access 250 Mt of ore grading 4% Cu and extend the mine life to 2035. Its cost of $400 million makes KDMP the largest single investment in Zambian mining ever.

KDMP will make use of existing infrastructure as much as possible, to optimize capital investment. This will also allow the mine to increase production at the earliest time. Two shafts, No.1 and No.3, both equipped for men and material transport and hoisting rock, serve the south and north parts of the orebody to depths of 950 m and 590 m respectively. The rest of the existing infrastructure includes a concentrator near No. 1 Shaft, with capacity to treat 2.4 Mty of ore, and a backfill plant of 55,000 t/month capacity. Part of the tailings are classified for use as backfill, the rest are deposited in Lubengele tailings dam. At least 40% of the tailings produced will go back underground, thus reducing surface impact.

A new production shaft, No. 4 Shaft, will be sunk to a depth of 1,490 m. This new shaft is only about 125 m from the No. 1 Shaft, which is to be deepened to the same 1,490 m depth and then become the service shaft for KDMP. To speed up this shaft development, mid-shaft loading will be employed once the No. 4 Shaft has reached the same depth as the current bottom of No. 1 Shaft. A new ore pass, new tips and a new underground crushing facility will all be installed. Once all this has been achieved, KCM will be able to commission one hoist in the new shaft, giving production capacity of 3.5-4 Mty.

At this stage the other half compartment of No. 4 Shaft will be used to continue sinking to the bottom. New production levels are to be established at 1,050 m, 1,150 m, 1,250 m and 1,350 m. Mid-shaft loading should be achieved in 24-26 months. Another two years after that, the whole project should be complete.

An important part of the expansion plan is to use larger rail equipment to increase haulage capacity. Trident South Africa will supply Goodman locomotives and Galison will supply rail cars. Konkola is famous as the wettest mine in the world, currently pumping 290,000 m³/d. Going deeper, the water make will increase, expected to peak at around 430,000 m³/d, and then come down to around 350,000 m³/d when the project is complete and the 6 Mt/y production level has been achieved.

There are already 52 large pumps underground and the cost of pumping is 30% of the mining cost. The pump chamber on the 985-m
level is to be extended and a new pump chamber will be constructed on the 1,390-m level. KCM considers that the most secure and safe method of dewatering is to have a pump chamber near the bottom of the main production and service shafts. An advantage of the increased pumping requirement will be that more water will be discharged into the Kafue river. This will assist downstream economic activities.

Konkola mine’s power requirement will increase from 75 to 140 MW. Of this, 90 MW will be only for the pumping of water.

The above is known as Package A, except the expansion of the existing pump chamber, and has been designed by TWP. The shaft sinking is being undertaken by Grinaker-LTA and the hoist engineering by DRA.

TWP is responsible for the design of the headgear, shaft steelwork, underground pumping, underground crushing and ore handling, surface substation and electrical reticulation. The project comprises a vertical shaft from surface to 1,500 m and a sub-vertical deepening of 500 m.

TWP’s Mining Engineering department has submitted proposals requested by KCM for the undertaking of ongoing service for mine technical auditing and productivity/production improvement programme design and implementation, and for the design and construction of a major backfill plant to place 8 Mt/y of cemented fill.

Mining methods
The current mining method is sub-level open stoping (SOS). In future, the steeper parts of the orebody will continue to be mined by SOS, with backfill. The backfill will be primarily made with classified tailings, some mixes with cement, some without.

In shallower parts of the orebody, post-pillar cut-and-fill mining will be used where the ore horizon is not too thick and not so flat. Where the orebody is thick, overcut and bench will be the mining method.

Underground mine development has been awarded in two contracts, one to Luanshya-based Mpelembe Drilling and the other to Kitwe-based AAC Mining. KCM is buying and maintaining the mining equipment, mainly from Atlas Copco Zambia, Sandvik and Barloworld (the Caterpillar dealer) and the two contractors will use the machines.

In total, the Atlas Copco equipment fleet purchase is a massive order, the first tranche of 29 units comprised six Rocket Boomer 281 face jumbos, three Boltec H235 bolting rigs, two Simba H1254 production rigs, four ST710 and nine ST1020 Scooptrams, and five MT2000 Mine Trucks. The second tranche was delivered between May and December of 2006 – four Rocket Boomer 281s, one Boltec H235, two Simba H1254s, a bunch of Scooptrams (two ST2G5s, six ST710s and three ST1520s), along with four Mine Trucks – an MT2000 and three MT436Bs.

As KDMP moves more into a greater amount of lateral development, the 25-unit 2007 deliveries from Atlas Copco reflect that, being ten Rocket Boomer 281s, four Boltec H235s, three ST710 Scooptrams and four each of the MT2000 and MT4368 Mine Trucks. In addition, Atlas Copco has entered into the underground small drifter market, for bar...
and arm applications. Thus far, KCM has ordered ten Atlas CopcoBBC 120 F drifters.

Konkola is Atlas Copco Zambia’s biggest maintenance and repair contract (MARC). It is operating the MARC at Konkola 3 and Konkola 1 shafts with a total compliment of 150 people at present and this will be 250 by October 2007. Also, Konkola 3 shaft became the first mine in Zambia, where Promaint, maintenance software from Atlas Copco, is operational.

New, large mill
Konkola’s concentrator has already been upgraded from a capacity of 2.4 Mt/y to 3 Mt/y. Now, a new 6 Mt/y facility is being designed and built under contract by FFE Minerals, using expertise from its Indian, South African and US companies.

FFE Minerals will supply a complete grinding plant and a complete flotation plant. Primary crushing underground will produce a minus-152-mm product that will go to the milling circuit of two SAG and two ball mills. The flotation circuit will use very large cells. The scope of supply includes the design, engineering, erection and commissioning of the plants including material handling equipment, four large grinding mills, slurry pumps, hydrocyclones, primary rougher and cleaner flotation cells, regrind mill and a complete control and monitoring system for the plant. The flotation plant will be completed in late 2007 and the grinding plant in early 2008.

KCM recently invested in the $12 million sulphur burning acid plant at Chingola, for the Nchanga and Konkola operations. It produced its first acid in February 2006. With the capacity to produce 500 t/d of acid, mainly to supply the Nchanga Tailings Leach Plant to improve operational efficiency and reduce costs, thus enhancing and increasing production.

However, KCM now having its own acid plant is a benefit to all projects. Zambia’s Copperbelt is a major acid consumer.

Another new project at Nchanga that will benefit KCM is the new smelter, on which work is underway. Outokumpu Technology won the $24 million contract to design and deliver a new copper flash smelting plant. It will be fed with Zambian concentrates, mainly from KCM’s own mines, to produce 300,000 t/y of copper. Commissioning of the new smelter is scheduled for 2007.

The ultra modern smelter will be environmentally friendly as its operations will reduce sulphur emission arising from copper production to just 4%. Outokumpu Technology’s scope of supply covers the flash smelting licence, basic engineering for the whole smelter including drying, flash smelting, slag cleaning and also a cobalt recovery system as well as process gas cleaning, delivery of proprietary equipment for a flash smelting furnace and an anode casting shop. IM