



Julius Kruttschnitt
Mineral Research Centre

[<<back to News Archive](#)

P9 pay day wrapped in platinum



The R&D team with the Lonmin FCTR, from left, are: Lonmin R&D metallurgical assistant Emidio Simbine, FCTR project metallurgist Johan Steyn, Lonmin chief metallurgist Bert Knopjes, JKMRC metallurgical engineer Emmy Manlapig, Lonmin R&D superintendent Craig Goodall, and JKMRC Senior Research Officer Marco Vera.

BY David Goeldner
September 2001

A revolutionary approach to the design and construction of platinum processing operations has increased revenue for South Africa's third largest producer by several million rand a month.

Lonmin Platinum was the first to trial the JKMRC-AMIRA P9 project's Floatability Characterisation Test Rig, which has led to increased metal recovery at the company's Karee operation, northwest of Johannesburg.

Built by Baker Process - now Eimco - the P9 FCTR is essentially a portable pilot plant of flotation cells, pipes and monitoring equipment placed beside an actual processing plant.





Lonmin R&D superintendent Craig Goodall demonstrates the use of flexible piping allowing simple reconnection to different cells along the bank to simultaneously produce high, medium and low grade PGM concentrates.



Checking out the upgraded UG2 section of the Karee plant, based on FCTR design elements, are Lonmin R&D superintendent Craig Goodall and JKMR senior research officer Marco Vera.



These Karee UG2 flotation cells are aligned in a configuration similar to the P9 Floatability Characterisation Test Rig.

Like a medical doctor's stethoscope the FCTR reads the 'heart beat' of the processing plant. By temporarily redirecting mineral slurry through its bank of small pilot-scale flotation cells, it can help determine the overall 'health' of the operation.

Lonmin Chief Metallurgist Mr Bert Knopjes said the company embraced the FCTR concept as a quick and easy way to evaluate circuit changes and trial new equipment before any expensive decisions were made inside the actual processing plant.

"The FCTR is having an influence on new plant design," Mr Knopjes said.

"The recoveries on a new UG2 ore plant, modelled using the concepts of process control and circuit flexibility found in the FCTR, are so far four per cent higher than our other UG2 plants - and we don't think these others are that low either."

The results were so impressive that Lonmin has built their own version of the P9 FCTR which will influence the design and construction of two new plants coming on line in 2002. This is in addition to applying results obtained from FCTR technology to fine-tune Lonmin's five other concentrators on the platinum belt.

Being first in the queue through P9 project sponsorship, Lonmin's use of the test rig has paid off.

"There are things we have installed in our new processing plants that we wouldn't have done without P9's FCTR," Mr Knopjes said.

"We would have liked to have kept the original FCTR forever, but we had to let it go to Australia as part of P9's international research program."

The original test rig was relocated mid-way through 2001 to WMC's Kambalda nickel mine in Western Australia.

Unfazed, Lonmin has since decided to build not one but two FCTRs to replace the P9 rig. Modelled on the original P9 version, the first of Lonmin's test rigs has been built and installed at the Eastern Platinum concentrator, which has a throughput of 190,000 tonnes a month.

"When it comes to identifying areas of potential on our existing plants I can't afford to build just one rig to replace the P9 FCTR," Mr Knopjes said.

"If these projects are going to make money I can't wait the five years it would take for one FCTR to cover each plant."

Lonmin Platinum's Research and Development Superintendent, Dr Craig Goodall, said the involvement of the P9 project has continued throughout the design phase of the Lonmin rig.

"We've bounced a lot of ideas for our FCTR off Dr Emmy Manlapig and Professor J-P Franzidis from the JKMRC, and Dr Malcolm Powell and Martin Harris at UCT," Dr Goodall said.

"The layout of the Lonmin FCTR is larger than the original due to the inclusion of automatic sampling on all feed tail and concentrate streams, which could be done as there isn't the restriction of having to dismantle the rig and ship it long distances in a container."

He said the Lonmin FCTR would only need to be transported by road as far as the furthest concentrator located 30 kilometres away.

"The new FCTR has as much control as any full scale plant, including Mintek's PlantStar, which includes milling and flotation control modules," Dr Goodall said.

"All of the level controls and sampling are automatic, the air input into all of the cells is controlled by air valves attached to rotameters, and you can adjust the inputs using PI controllers.

"We've tried to improve on the things we thought could be improved on from the first FCTR."

The Lonmin FCTR also has a number of pilot milling, screening and classification units.

Dr Goodall said the FCTR was designed to be a flexible platform able to test different circuit configurations.

"We've included quite a few of the design elements of the P9 FCTR in the recently commissioned UG2 section of the Karee plant, such as being able to move the feeds up and down the banks," he said.

"Each cell now has its own feed port, as well as a connection to the previous cell, allowing us to produce individual high, medium and low grade concentrates, instead of just one grade at a time.

"From an overall point of view it's the FCTR's flexible features that we've designed into Karee."

He said the new Karee UG2 plant took less than three months to commission, largely due to the way it was built with circuit configuration ideas from the FCTR, and an exceptionally high level of process control.

"Karee is now performing two per cent better than its designed grade and recovery which translates into a lot of money - perhaps as much as several million rands a month."

While the P9 FCTR has helped remodel the mixed ore mill at Karee, the Lonmin-built FCTR at Eastern Platinum will be used to decrease cleaner tails grade by 66 per cent.

"We have been using our new FCTR at Eastern to run a fine milling test program," Dr Goodall said.

This new FCTR will move to Karee in October 2001 to pick up where the P9 rig left off at the end of 2000, optimising the circuit, and to commence test work for an open cut mine to be commissioned late in 2002.

"We don't have the flexibility to change the plant at Eastern Platinum in the way we did at Karee, but we are building two new plants, and we will certainly use the FCTR's flexibility in their design."

The money spent on the FCTR - estimated at about AUD\$1million - was insignificant when compared with the potential gains from new plant design, Mr Knopjes said.

"A good project is a two per cent gain in platinum recovery, which we'll get, no doubt, so the cost of the unit is insignificant."

An important spin-off for Lonmin Platinum is the application of the FCTR for training purposes.

"We pride ourselves on having the most capable people in the industry, or at least the biggest share of them," Mr Knopjes said. "Other than using the FCTR for our own R & D, we will have the finest tool in the industry to train metallurgists."

It was on this basis that South Africa's Department of Science, Technology, Arts and Culture injected R500000 into Lonmin's FCTR research and development program.

This financial assistance helped Lonmin acquire Mintek's PlantStar system for the rig. Because of this enhanced degree of control and instrumentation, Lonmin can train its metallurgists to understand and control the milling and flotation responses to changes on a live plant.

"Through our use of technical innovations such as the FCTR we are creating an environment where we can attract people of triple A plus character to the mining industry in South Africa, and hopefully hang on to them for a while," Mr Knopjes said.