

36' x 19.5' SAG mill and 22' x 34' ball mill – This SAG mill is Africa's largest diameter gear driven mill

GRINDING MILLS

Poised to take on **any commodity**

New Concept Projects (NCP) is fast becoming the first point of call in grinding mill circuit design, offering machines that are broadening the use of grinding mills across different commodities, writes senior applications engineer **LEONARD GOUGH**.

The importance of correctly choosing crushing and milling equipment is well known in any process plant design, with the number of combinations in which one may select equipment for comminution circuit design seemingly endless.

To add to this, ever-evolving developments in the field of grinding mills leaves engineers spoilt for choice.

Johannesburg-based NCP has recently completed delivery of mills suited to some uniquely-focused challenges. These challenges are indicative of some of the latest trends emerging in modern mineral processing and comminution.

One such trend is the use of grinding mills in diamond recovery processes. Fully autogenous grinding (AG) allows for a simpler flowsheet and provides a very effective method of extracting large gemstones from the traditional and more competent kimberlites.

Recent applications of this method have yielded record-breaking stones as the understanding and use of AG milling increases in precious stone recovery.

NCP has recently designed and delivered two AG mills to a diamond project in East Africa. These mills were both designed as classic high aspect ratio or "pancake-type" units, featuring a grate discharge configuration and zero percent steel charge.

Process design in leaching circuits is also taking bold steps toward improving recoveries while reducing plant operational expenses.

A novel approach using acidic milling solutions ($\text{pH} < 2$) has been shown to improve leach kinetics as well as improving water balance in the overall circuit. This design philosophy requires a grinding mill with a highly-demanding material specification: one which can withstand low pH environments and the highly abrasive nature of milling.

NCP embarked on an ambitious project to deliver a mill which could handle such a design brief. Through comprehensive material tests and research, the resulting unit became the world's first trunnion supported fully stainless steel mill.

A stainless steel shell with cast stainless steel ends resting on a trunnion-supported bearing arrangement minimised the corrosive effects of the acidic slurry, with the "non-traditional" liner design compensating for the abrasive slurry environment.

Lastly, the development of large diameter girth gear driven mills now allows engineers the flexibility to design plants with large throughputs while avoiding the need for hugely expensive gearless drive mills.

NCP works closely with world-leading gear manufacturers to obtain the best performance from large diameter girth gears. Modern girth gears can now transmit powers in excess of 18 MW, split between two pinion drives. The advantage of this is that engineers can design large plants to meet economies of scale without incurring excessive milling circuit capital costs.



18' x 16' fully stainless steel mill for a milling-in-raftinate, copper application

In line with this, NCP has designed and delivered the largest diameter gear-driven mill in Africa which also carries the world's largest spheroidal-graphite iron gear ever manufactured. The design and technology has room to go larger still, with gear-cutting facilities now allowing up to 16 m diameter.

Despite its significant foothold in Africa, the company continues to grow its footprint across the world, having undertaken projects in Canada, Peru, Mexico, Ireland, Kazakhstan and Cuba. These installations now complement the solid base of African installations covering most of the continent with installations in Egypt, Liberia, Tanzania, the Democratic Republic of Congo, Morocco, Namibia and South Africa.

NCP's in-house mechanical design and process team continues to search for unique ways to apply milling technology to an increasingly wider range of commodities. **MIRA**