

INNOVATING PROCESSES - MINTEK



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MIND SHIFT

INNOVATION, DIGITISATION & SKILLS IN THE SOUTH
AFRICAN MINING SUPPLY CHAIN

INCLUDING THE:
INNOVATION FOR MINING & MANUFACTURING
EXCELLENCE AWARDS

24 - 25 MAY 2023

IDC CONFERENCE CENTRE, 19 FREDMAN DRIVE, SANDTON



A global leader in mineral and
metallurgical innovation

“The objects of Mintek are through research, development and technology transfer, to promote mineral technology, and to foster the establishment and expansion of industries in the field of minerals and products derived therefrom.”

(Mineral Technology Act No 30 of 1989)

- Basic research
- Fundamental research
- Technology development
- Advanced development
- Concept development
- New product development
- Process development
- Prototyping
- R&D portfolio management
- Technology transfer
- Technology licensing

Mineral Processing & Metallurgical Engineering Services



Mining & minerals value chain



SECONDARY FOCUS

PRIMARY FOCUS

EXPLORATION STAGE : Geochemical sample analysis and mineral ore characterization

CORE ACTIVITIES : Range from **initial investigations** to **process development** and the **design, construction**, as well as **commissioning of industrial plants**

OFFERINGS : Working closely with clients, and in conjunction with engineering partners, Mintek supplies a flexible package of technology for process development and optimisation, products and services

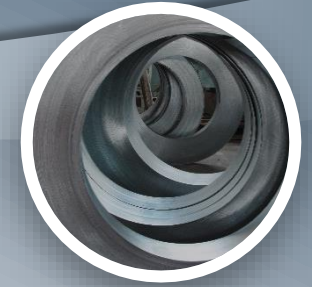
- How Mintek works to maintain an environment where innovation takes place, including **maintaining a skills pipeline**

Conduct relevant, applied research and technological innovation by pursuing a focussed approach to research and technology development that emphasises high-impact scientific outputs and outcomes;

Develop a capable workforce that has the requisite skills, expertise and capabilities to drive and support rigorous scientific research and technological development in pursuit of Mintek’s mandate of conducting research and fostering industry development and expansion.

- How Mintek partners other role players e.g. the mining industry, mining supply chain and other research institutions, to strengthen and guide its work

- Engaging with our **stakeholders** to understand and address their needs
- Establishing **partnerships** to help maximise our multi-disciplinary expertise, accelerate innovation, develop technological solutions and transfer technologies

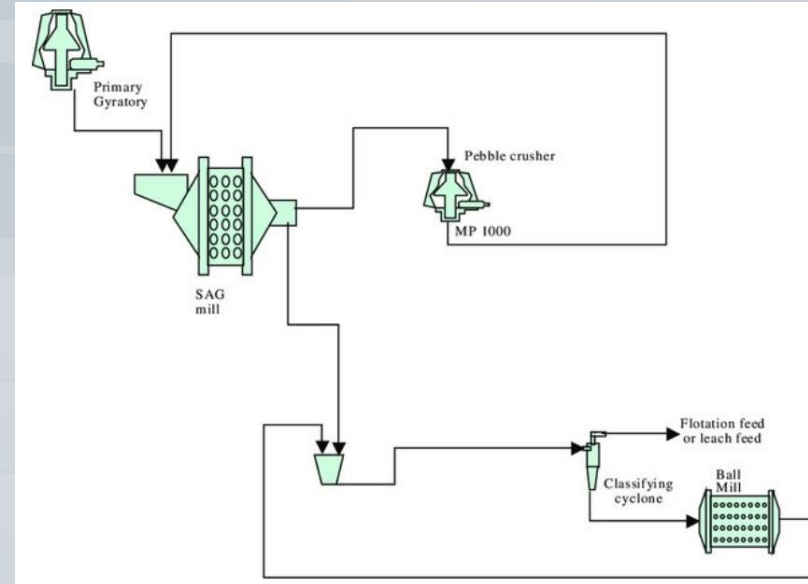


Examples of some technologies recently developed by or under development by Mintek, including reference to any digital aspects

Mintek Technologies

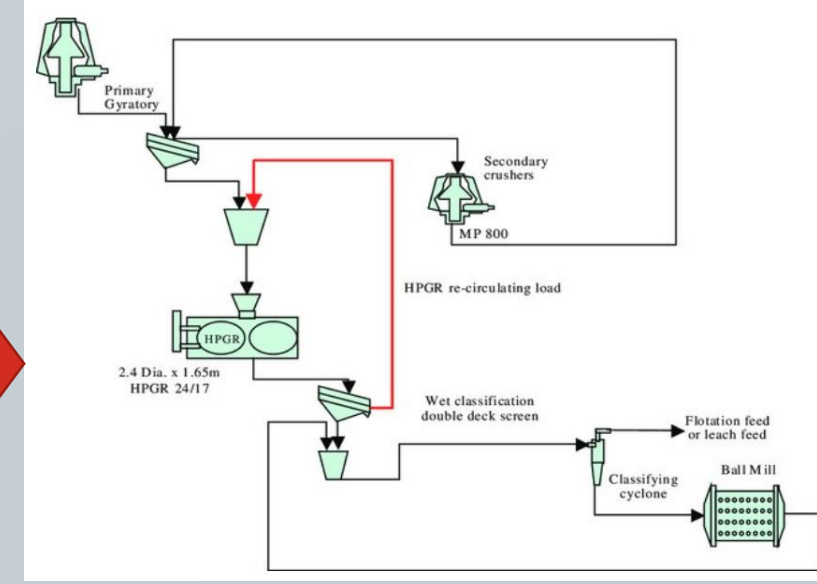
Minerals Processing Challenges

- Increasing mills size for higher throughput to compensate for declining ore grades
- Higher throughput accompanied by higher energy requirements
- Standard comminution tests require representative samples to generate data for the design and evaluation of comminution circuits
- How representative are small samples to represent larger ore bodies for data reliability?
- Current power models which do not take into account some of key parameters i.e. Charge PSD & Lifter Configuration etc.



Conventional S(AG) circuit – SABC

- Development and validation of mill power draw model
- Model takes into account the mill dimensions, charge PSD, mill speed, mill filling and lifter configuration
- Testing facilities using small and large bulk samples to generate data required for design
- Instrumented facilities to measure and record operating and testing conditions
- Partnership with industry and Research institution in development of energy efficient flowsheets for various ores



Conventional HPGR circuit design

Mintek's Comminution Programme



Pilot & Lab equipment for Tests & Services

- Low grade ore deposits are attractive due to the rising demand for battery minerals
- Fine processing, pre-concentration, energy and water efficient technologies become imperative for deposits to be economically viable.
- Mintek partners with various equipment suppliers to offer innovative solutions to the industry
- Recycling of plant water technologies to minimise the usage of fresh water



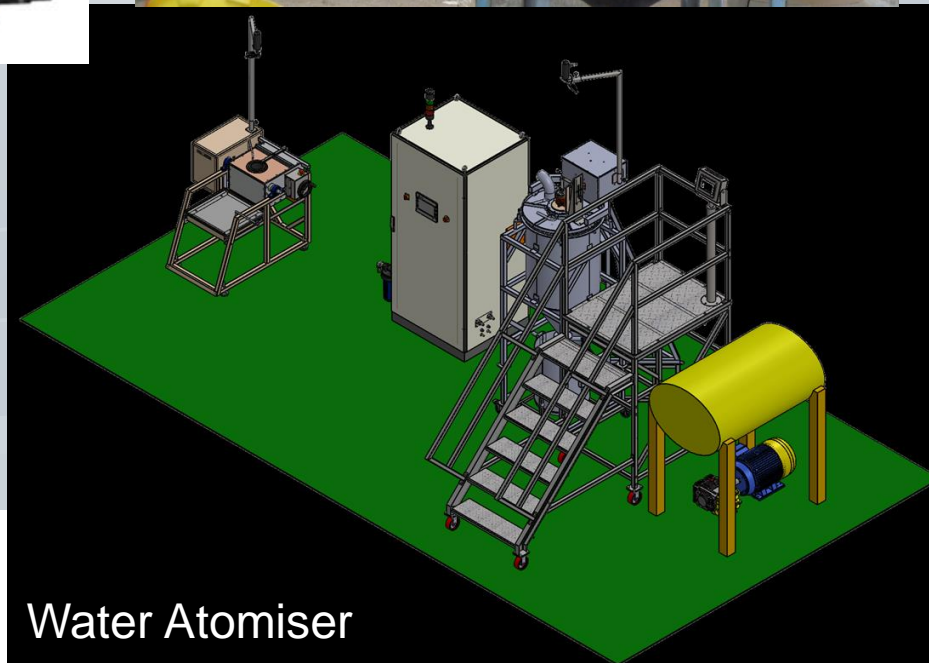
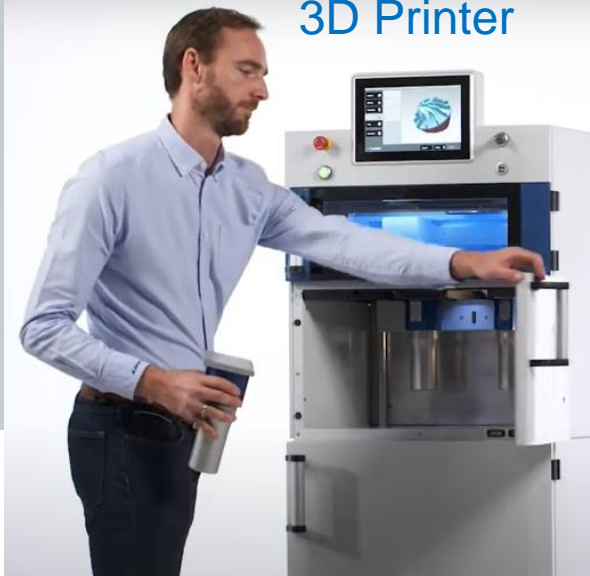
Ultrasonic Atomiser - AMAZEMET



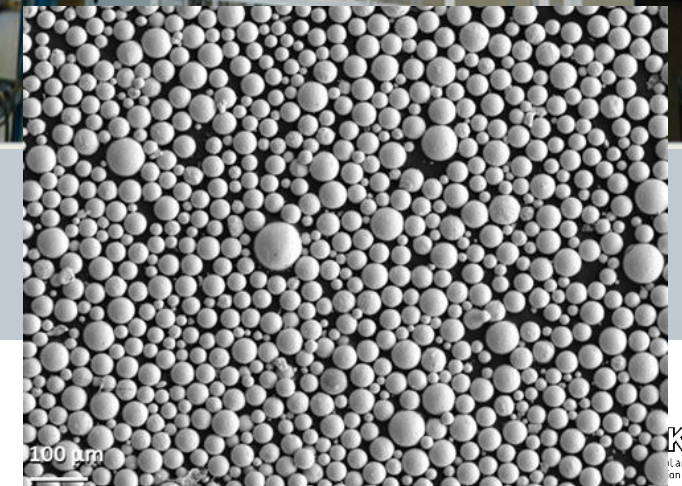
Gas Atomiser (Hot Platinum)



3D Printer

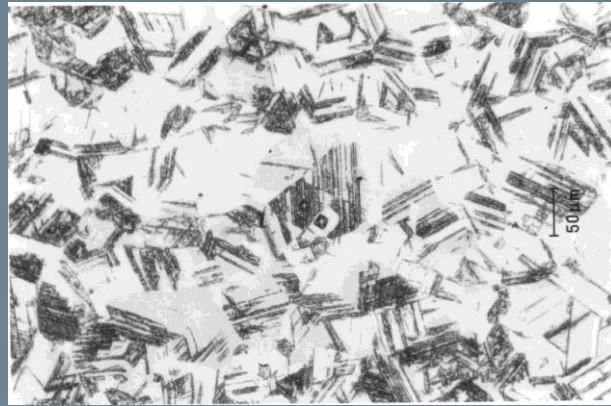
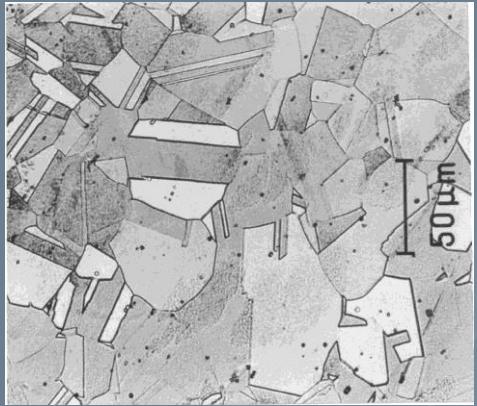


Water Atomiser



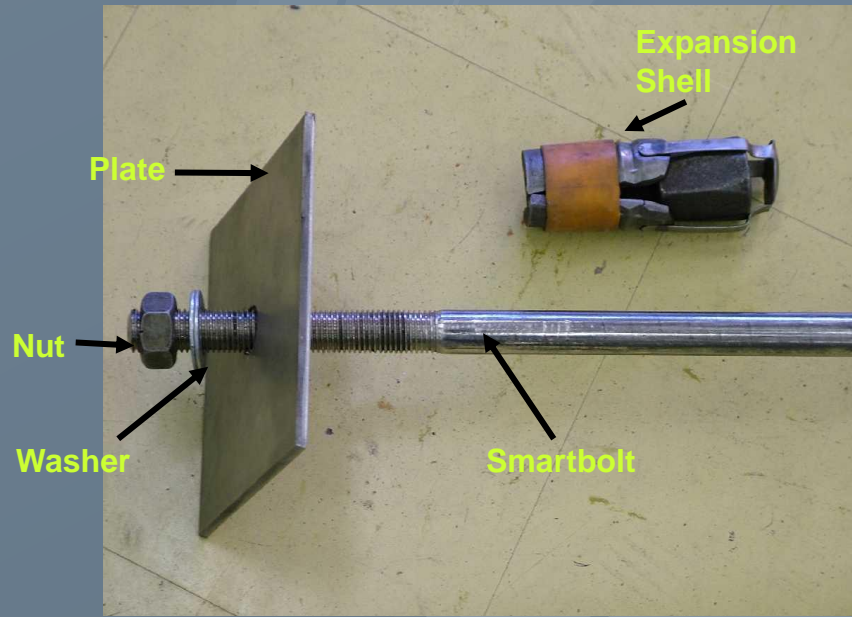
Safety in Mining – Smartbolt Technology

Developed and a Smartbolt alloy that is used as a **strain monitor** in rockbolt applications for the mining industry



Smartbolt alloy showing strain induced martensite (SIM) plastically strained condition (higher strains) $\gamma \rightarrow \alpha'$ transformation

Installation and Monitoring Stage



Specialised Instruments

CYNOPROBE



Online and laboratory measurement of cyanide concentrations for gold leaching

LAB CYNOPROBE

C² METER

Online measurement of adsorption carbon profiles in gold leaching processes



Process Control Software



Stabilisation and optimisation of power input for ferroalloy smelters



Optimisation of cyanide dosing and carbon profiles for gold leaching processes



Stabilisation and optimisation of milling and flotation processes



Mintek has diamond fingerprinting expertise to trace origins of diamonds.

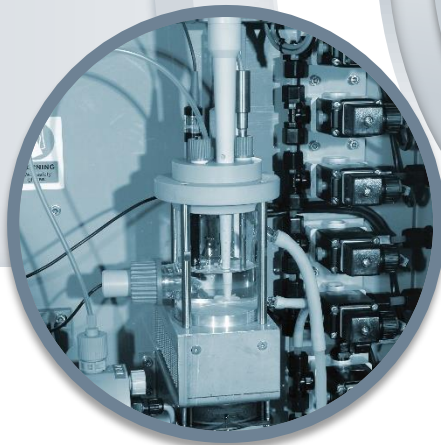


Mintek has some of the world's largest scale test facilities, for example the 4MVA DC test facility



 Gold	 PGMs	 Ferrous Metals	 Equipment & Technology	 Base Metals
 Industrial Minerals & Diamonds	 Process Control Strategies	 Uranium	 Rare Earth Elements	 Economic & Regional Studies

Thank You



Mintek_RSA



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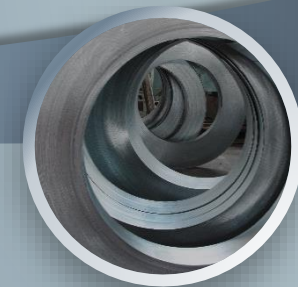


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www.mintek.co.za



Questions?