

# UNDERGROUND MINING CAPABILITIES

Mintrex leverages its key strengths garnered from years of combined experience to support its clients with innovative solutions in the most challenging of environments.

## Key Strengths

- Engineering design: Mintrex has a highly-developed awareness of the limitations of designing underground. It places significant emphasis on the critical front-end thinking to solve difficult problems;
- Pump station installations: The business has designed numerous pump station installations over many years and is well-recognised in the industry for this capability;
- Paste / backfill design: Working for paste plant manufacturers, Mintrex has completed the detailed design on a number of paste / backfill plants;
- Certified Auditors for the Western Australian Mines Department; and
- Tom Kendall is a long-standing member of the Australian Standards Sub-committees ME-18-03 and ME-18-03 of Standards Australia. These sub-committees are responsible for AS 3785 and AS 3637. During Tom's involvement with these sub-committees, most of the standards have been reviewed and the following updated standards have been issued:

AS 3785.1-2006      Underground mining—Shaft equipment—Shaft overwind safety catch system

AS 3785.2-2006      Underground mining—Shaft equipment—Shaft winding arresting systems

AS/NZS 3785.6:2015      Underground mining - Shaft equipment - Fixed guides, rope guides and rubbing ropes for conveyances

AS 3785.7-2006      Underground mining—Shaft equipment—Sheaves



White Hope flasks & skip loading



Underground Pump Station at KCGM's Chaffers Shaft

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During the 1980's and 1990's the Mintrex and Kendall Engineers business based in Kalgoorlie, undertook significant underground brownfields design work for major regional clients, notably Western Mining Corporation (WMC) and Kalgoorlie Consolidated Gold Mines (KCGM), as well as smaller companies and mining contractors. Mintrex completed a number of assignments at major mines including the redesign of the Jan Shaft and Junction headframes, modifications of the Revenge underground conveyor and a number of underground pump station installations at Kambalda for WMC.

For KCGM, the business completed the design of a significant modification of the Cassidy Shaft 36 level underground crushing station and optimisation of the flasks and skip loading station, and designed the underground pump station on the 23 level at the Chaffers Shaft, which at that time was established to dewater the golden mile and superpit.

For smaller companies the following were all designed by, or had a major part of the design completed by Mintrex:

- The winder and hoisting system, the headframe, skip and loading station design for the White Hope mine south of Kalgoorlie;
- The headframe design for the Paddy's Flat mine in Meekatharra;
- The headframe, skip and loading station design for the McKenzie shaft north of Kalgoorlie; and
- The hoist, headframe, skip and loading station design for the Kohinoor mine near Cue.

With the opening of the Mintrex business in Perth in 2001, it quickly became one of the preferred design groups for a number of smaller mining contractors. In the years that followed, Mintrex designed the Chariot mine emergency egress shaft sets and services layout and Chariot ventilation shaft lining for Giants Reef Mining in Tennant Creek, as well as an innovative roll-in, roll-out headframe for the ventilation shaft. Mintrex designed a highly innovative shaft lining, services and haulage / fit-out for the Copeton mine near Inverell in NSW. In this particular application, the full shaft furniture which included skids for the skip, a brattice to protect the ladderway and services and shaft sets for 60m of vertical shaft, were all able to be fully installed and fixed in two days.

Both these projects involved highly innovative solutions developed in collaboration with the client. At the North Woah Hawp mine in Ballarat in Victoria shaft sets were designed to allow sinking over a fire damaged and collapsed shaft and rehabilitation of the damaged shaft within a new shaft.

Mintrex has provided the skips and headframe design and statutory submissions for many other small mines and sample winzes and was a pioneer in the development of portable headframes in place of tripods in the goldfields of Western Australia.

Additionally Mintrex has provided Design Verification services for underground structures and mechanical equipment.

In 2008, Mintrex completed the upgrade design of the underground conveying and crushing station at the Sydvaranger magnetite project in Norway for Northern Iron. This project involved the installation of three cone crushers, recommissioning a series of conveyors in underground tunnels and design of an additional movable conveyor.

In 2014 Mintrex completed a dewatering options study for the Degruusa underground mine in WA to respond to the potential for emergency water ingress. That study considered clean and dirty water pumping, plunger and diaphragm pumps, submersible and horizontal centrifugal pumps and the need for a reliable system, preferably with rotatable spare components.

In 2015 Mintrex completed the front end engineering design (FEED) for the underground primary dewatering system at OceanaGold's Didipio copper-gold mine in the Philippines. The underground mine is located under the associated open pit mine in an area with high seasonal rainfall and water is expected to enter the underground mine from the open pit as well as from regional geological structures.