



SIKA AT WORK

ZINC BIG IN THIN AIR

SIKA AT MINERA VOLCAN CHUNGAR MINE, PERU

BUILDING TRUST



MINERA VOLCAN CHUNGAR MINE

PROJECT DESCRIPTION

The Chungar division of Volcan Compania Minera, one of the largest zinc and lead miners globally and partly owned by Glencore plc is located in the department of Cerro de Pasco around 200km NE of Lima, Peru. The Chungar cluster is located around 4.600m above sea level. Mineralization is hosted in skarn altered rocks and as limestone replacement which are typical in the miocene metallogenic belt of central Peru. The mine has been commissioned in 1998 and is today an underground mining cluster comprising two large underground operations of a combined ore output of roughly 2 million tons per year. Volcan operates an in cycle shotcrete set-up at Chungar, utilising around 40.000 m³ of fiber reinforced sprayed concrete annually.

Fast development rates and rapid mine cycles are key for the operation and to source the daily ore throughput of 5.300 tons. As the mine reached consistently deeper levels, transport distances are getting long and time consuming and haulage congestions along the ramp infrastructure are having a negative impact on the overall efficiencies of the mine. Therefore, the Chungar operations are currently transitioning to a slick-line supply of concrete from the batch plant on surface to the underground infrastructure. The Sika team worked very closely with the mine site team and its contractors and performed extensive site trials to elaborate the best performing mix design that allows trouble free and safe operation of the slick line and a reliable supply of concrete for the extensive underground shotcrete applications.

EFFICIENT SLICK LINE CONCRETE MIX DESIGNS

Elaborating the best performing mix design for the newly installed slick line at Chungar posed a challenge for all involved parties. The slick line has a total vertical extent of 370m with a horizontal deviation of 7m. Initial problems with concrete segregation had to overcome in order to supply a good quality concrete through the line and maintain the specified properties also at the outlet of the slick line. Avoiding blockages of the line and operating a stable concrete mix throughout the daily operation of the batch plant is critical.

A minimum energy absorption of the shotcrete liner of 700 joules (EN) at a cement consumption of only 400 kg/m³ shotcrete needs to be maintained. At the same time, the used shotcrete accelerator needs to provide high early strength development within the first 4 hours to minimize the re-entry time for subsequent bolt installation and hence short cycle times.

PROJECT REQUIREMENTS

The major specifications for the sprayed concrete are to achieve relatively rapid, high early strength to allow for short re-entry times. Summarized, the Volcan Chungar requirements for the shotcrete are as follows:

- Trouble free, daily operation of the slick line
- Rapid early strength development
- High final strength
- High energy absorption of the shotcrete liner
- Low cement consumption
- Minimum consumption of shotcrete accelerator to achieve the required early strength



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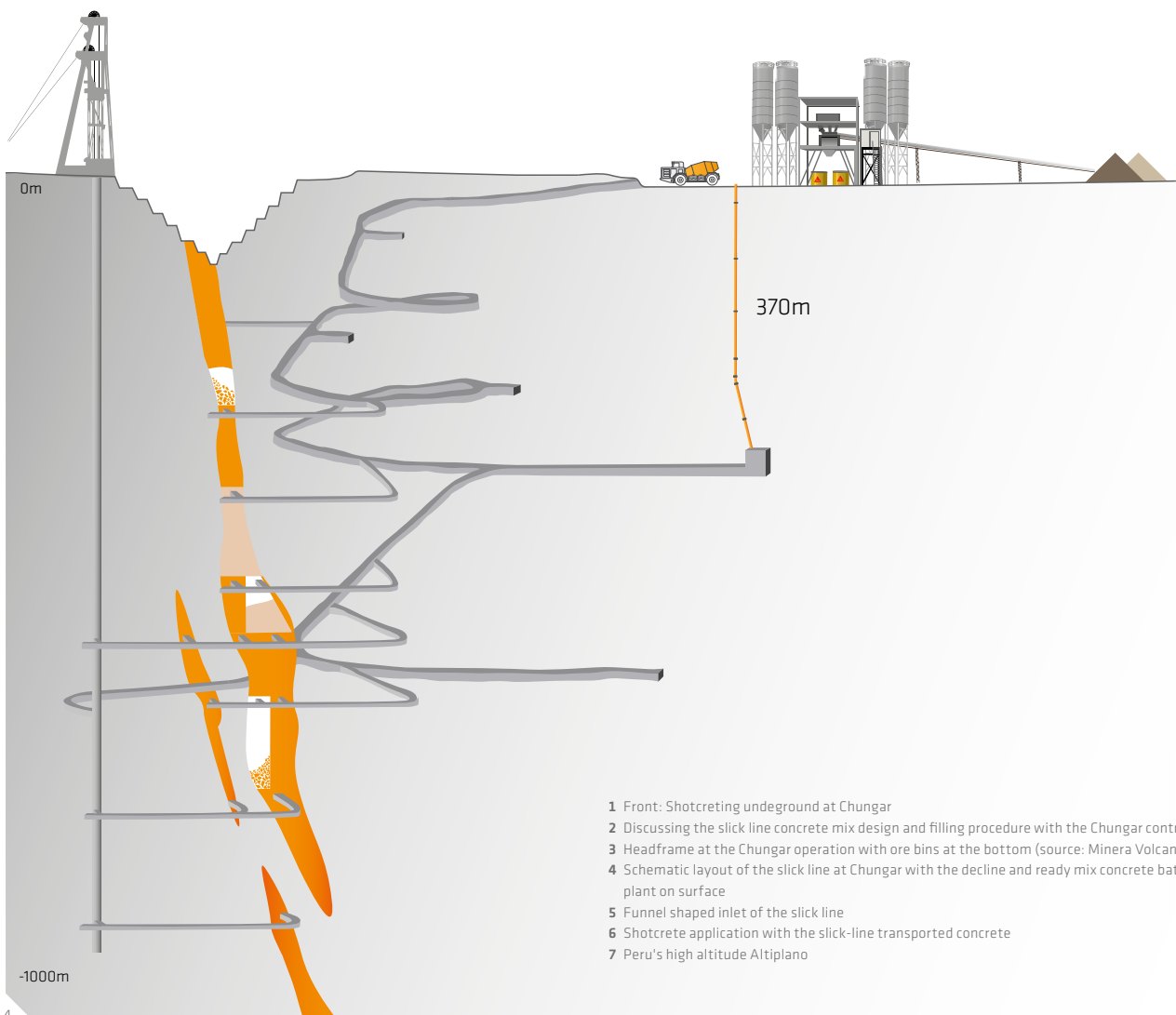
SIKA SOLUTION

Volcan compania Minera is a long standing partner of Sika and relies on the proven Sika Sigunit® L53 AF shotcrete accelerator technology which is a very stable and high performing product and a go to solution in many key mining projects globally with a few distinct advantages compared to products from competition. These advantages include rapid early strength development with a large variety of cement types at a moderate dosage, good stability and easy handling of the products in bulk storage. For the special slick-line concrete mix design, Sika developed a special Superplastiziser, the Visco-crete® SC 90, that prevents the concrete from segregating while flowing down the line and strongly reduces the risk of line blockages in the daily operation. SikaFiber® technology is used to reach a good yielding of the sprayed concrete and the required energy absorbtion at a minimized fiber dosage.

Sika was not only involved in assisting with the special slick line concrete mix design, Sika also provided valuable inputs with the operational procedures of the line and implemented best practices and lessons learned from many other mining projects worldwide.

SELECTION OF SIKA PRODUCTS

- Sika® ViscoCrete® SC 90 Superplasticizer/Slump retainer
- SikaTard® 930 Consistency stabilizer
- Sigunit® L53 AFX Alkali-free, high performance shotcrete accelerator
- Sika Fiber® Macro steel fibers
- Sika PM 4210 Wet shotcrete spray units
- Many other Sika construction products



- 1 Front: Shotcreting underground at Chungar
- 2 Discussing the slick line concrete mix design and filling procedure with the Chungar contractors
- 3 Headframe at the Chungar operation with ore bins at the bottom (source: Minera Volcan)
- 4 Schematic layout of the slick line at Chungar with the decline and ready mix concrete batch plant on surface
- 5 Funnel shaped inlet of the slick line
- 6 Shotcrete application with the slick-line transported concrete
- 7 Peru's high altitude Altiplano

MINERA VOLCAN CHUNGAR MINE



PROJECT PARTICIPANTS

Owner: Volcan Compania Minera/Glencore
Participants: Chungar, Robocon, Sika Peru

Our most current General Sales Conditions shall apply. Please consult the most current local Product Data Sheet prior to any use.



SIKA SERVICES AG
Tueffenwies 16
CH-8048 Zurich
Switzerland

Contact
Phone +41 58 436 40 40
www.sika.com/mining

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