



**SIEMAG
TECBERG**

TECHNICAL INFORMATION

CENTRALISED P.E.S. MINE COOLING SYSTEM

(LIUZHUANG MINE, CHINA)

TECHNICAL INFORMATION

FIRST CENTRAL MINE-COOLING SYSTEM WITH SIEMAG TECBERG TECHNOLOGY IN CHINA

SIEMAG TECBERG has received an order for the supply, installation and commissioning of a centralised mine-cooling system from SDIC Xinji Energy Co. Ltd. in the province of Anhui in China. The system is to be set up at the new mine of Liuzhuang and comprises a central cooling unit on surface and a pressure exchanger – the Pressure-Exchange System (P.E.S.) developed by SIEMAG TECBERG, also known as three-chamber pipe feeder – with pumps and distributor equipment situated in the underground.

In order to increase production capacity, coal is being mined from strata located at ever-increasing depths where ground temperatures are much higher. In addition, much stricter demands are now being made on working conditions in Chinese mines, where temperatures exceeding 26 °C in working faces are no longer permitted.

To achieve the prescribed temperature in underground working areas, the air in the mine has to be cooled down. The cooling power for each working face is calculated taking into account the rock temperature (in this case approximately 40 °C at a depth of 760 m), the quantity and temperature of the air, the rated electrical power of the mining machinery and the heat it emits, as well as losses in the piping network. The overall cooling capacity depends on the number of working faces and driving faces in operation simultaneously. The calculations carried out for the Liuzhuang mine by DMT GmbH & Co. KG (formerly DMT-Gesellschaft für Forschung und Pruefung mbH) in Bochum, Germany, yielded a required cooling capacity of 22 MW for operations in three working faces with a daily production quantity of 10,000 tons of coal and 15 driving faces for the development of new mining fields.

During the first phase, the cooling capacity installed was 5.5 MW. SIEMAG TECBERG is supplying the central cooling unit including installation material as well as the first charge with the required water additives. The cooling system is assembled in a building constructed by the customer on surface. The cooling medium of water is cooled down to 3 °C by two turbo chillers and return cooling takes place in four evaporation-cooling towers.

The water lost by evaporation is replaced with fresh water which is treated beforehand in a special water-treatment plant. The water-treatment plant is fitted with equipment for softening the water and adding chemicals as corrosion protection, hardness-stabilisers and biocides. In the primary circuit, the cold water is pumped to the underground through insulated shaft pipes at a rate of 300 m³/h by a 120 kW frequency-controlled chilled-water pump.

The secondary water circuit, which connects directly with the coolers in the working faces, is located in the underground. The primary water circuit with its operating pressure of approximately 80 bar in the underground is coupled to the secondary water circuit with approximately 30 bar by the Pressure Exchange System (P.E.S.). The use of the P.E.S. system has proved highly economical and efficient in many mine-cooling systems.

The circulation of water in the secondary circuit is powered by one pump equipped with two 250 kW motors. The distribution of the water in the underground is controlled by seven industrial PCs with connected control and measuring devices. The connection between the PCs themselves and between the PCs and the control systems on surface is via Ethernet-TCP/IP.

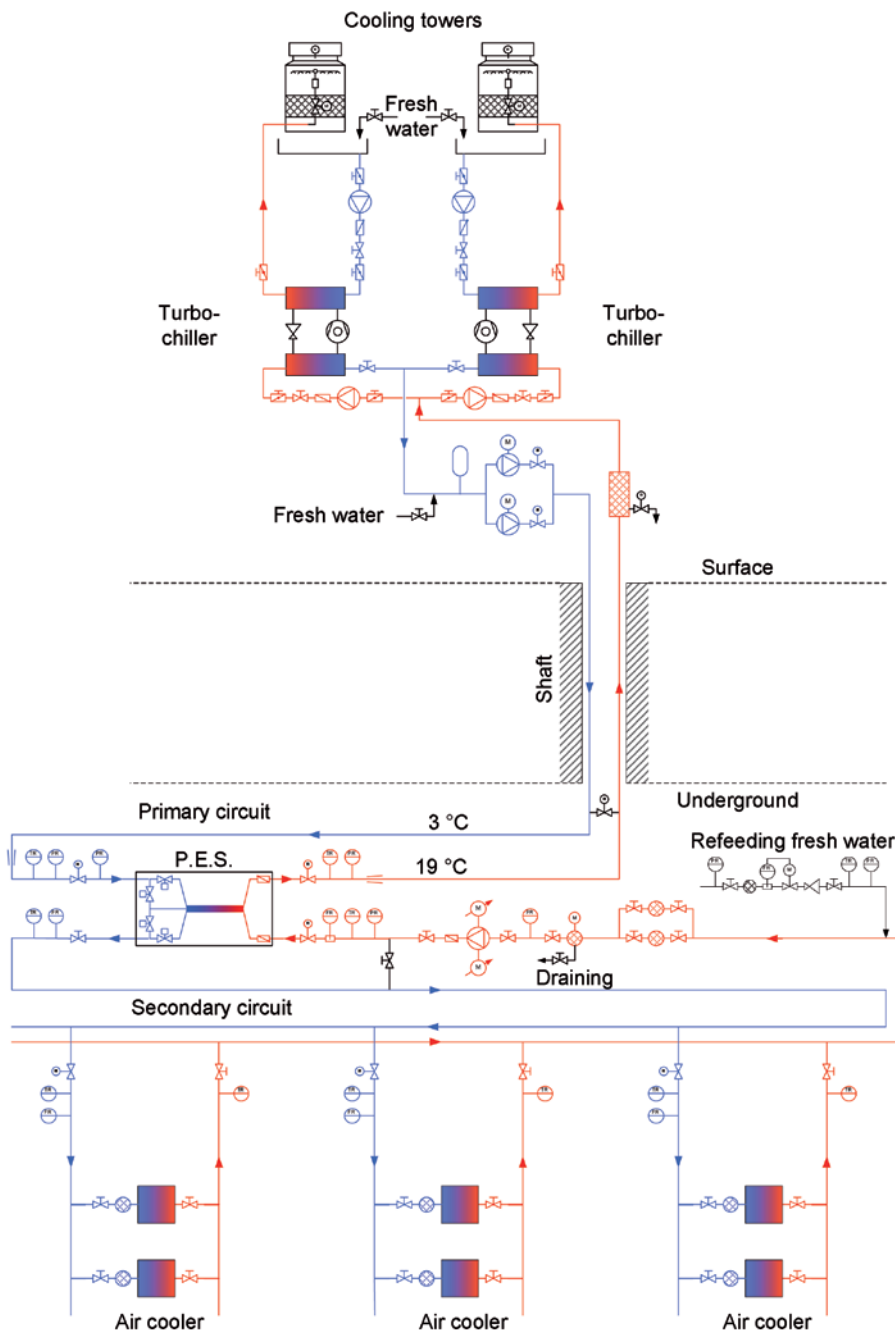
One of the greatest challenges of the project was the short delivery period of six months and the MA certification (Mining Products Safety Approval and Certification) for the equipment destined for use in the underground.



Turbo chiller

Centralised cooling systems in mines with chilling of coolant on surface is already common practice in Germany. In closed piping systems, the cold stored in water can be transported to underground air coolers economically and without significant loss while the pressure exchanger ensures a controlled volume flow and the transmission of the required chilling capacity to the secondary cooling circuit with a temperature increase of less than 0.5 °C.

GENERAL LAYOUT CENTRAL MINE COOLING SYSTEM



Liuzhuang mine



Wet cooling tower on roof

TECHNICAL DATA

Chilling capacity	5.5 MW
Chilled-water volume flow	300 m ³ /h
Chilled-water temperature	about 3 °C
Warm-water temperature	about 18 °C
Chillers	2 turbo chillers of 2,875 kW each
Shaft pipe	DN300
P.E.S. level	-762 m
Main valves	DN200, PN100
Pipe chambers	DN500, PN100
Overall length of pressure exchanger (P.E.S.)	26 m
Nominal pressure of primary system	100 bar
Nominal pressure of secondary system	64 bar



LOCATIONS:

GERMANY | HAIGER (HEADQUARTERS)

SIEMAG TECBERG GmbH
Kalteiche-Ring 28-32
35708 Haiger, Germany
Phone +49 2773 91610
E-Mail info@siemag-tecberg.com

POLAND | KATOWICE

SIEMAG TECBERG POLSKA Sp. z o.o.
ul. Mickiewicza 29
40-085 Katowice, Poland
Phone +48 32 2072086
E-Mail info@siemag-tecberg.pl

SWITZERLAND | SEDRUN

SIEMAG TECBERG GmbH
Plant Operation
7188 Sedrun, Switzerland
Phone +41 81 9365280
E-Mail info@siemag-tecberg.ch

CHINA | BEIJING

Beijing SIEMAG TECBERG
Mining Equipment Co., Ltd.
Room 21-03, Block A, CITIC Building
19 Jianguomenwai Dajie,
Beijing 100004, P.R. China
Phone + 86 10 8526 1713
E-Mail info@siemag-tecberg.cn

CHINA | TIANJIN

Tianjin SIEMAG TECBERG Machinery Co., Ltd.,
Guangyuan Road South,
Tianjin High-Tech Industrial Park,
Third Phase Wuqing Development Area,
Tianjin 301700, P. R. China

AUSTRALIA | SYDNEY

SIEMAG TECBERG Australia Pty Ltd.
Unit 7, 2 Eden Park Drive (PO Box 1442)
North Ryde NSW 2113, Australia
Phone +61 2 9888 3900
E-Mail info@siemag-tecberg.com.au

SOUTH AFRICA | JET PARK

SIEMAG TECBERG (Pty) Ltd.
Unit 15, Lakeview Business Park,
Yaldwin RD, Jet Park, Johannesburg
P.O. Box 2964, Edenvale 1610,
South Africa
Phone +27 11 383 9300
E-Mail info@siemag-tecberg.co.za

SOUTH AFRICA | GERMISTON

Winder Controls (Pty) Ltd.
56 Stanley Street, Germiston, Ext. 3, Gauteng,
P.O. Box 383, Germiston 1400,
South Africa
Phone +27 11 873 4650
E-Mail winder@winder.co.za

USA | MILWAUKEE

SIEMAG TECBERG Inc.
2969 South Chase Avenue
Milwaukee, WI 53207, USA
Phone +1 414 727 5725
E-Mail info@siemag-tecberg.us