

Highly reliable power supply

Siemens PTI delivers power system studies and professional training to all Titan Cement plants in Greece and Southeastern Europe

At a glance

Titan cement is a global player in the cement business and operates several plants for cement production. During the last years Siemens has been supporting Titan with technical consulting to further improve the reliability and performance of its plants in Southeastern Europe.

Initial situation and challenge

The plants are located in different countries across Southeastern Europe. The technical coordination of all plants is handled by a central planning department in the Titan head office in Athens, Greece. The technical condition of the sites differs with regards to the state of equipment, the year of construction of the plants, as well as the personnel's experience.

The objective for Titan was to harmonize the operation and planning standards of the electrical supply in terms of best practice and cost efficiency. The basis of all power system consulting tasks is the consolidation of all network data to gain a profound understanding of the plants' performance. An analysis of the power system includes the technical evaluation of the following criteria:

- personal safety
- supply reliability
- cost efficiency for both CAPEX and OPEX.

The first criterion does not only refer to the condition of the installed equipment, but also includes the correct selection and design of the protection concept with respect to the sensitive pick-up, high speed and therefore minimization of health risks for the operational staff.

Besides reliable and well-maintained equipment customized network structures and an optimized system design are crucial aspects of a reliable plant operation. During power system design it is important to ensure that the reliability of the power system is not negatively affected by cost efficiency measures. Components such as variable speed drives or var power optimization equipment as capacitor banks reduce losses and decrease the OPEX. But these measures can significantly influence the power quality. Therefore all cost-optimizing measures have to be carefully selected, designed and coordinated: This requires a broad technical background and experience.

With Siemens PTI Titan has found a competent partner to develop a feasible concept for the technical optimization of the cement plant's power supply system.



Figure 1: Studies were performed for Titan Group cement plants located in Greece, Serbia, Bulgaria, Kosovo, and F.Y.R. of Macedonia.

The solution

At the beginning of the project, Siemens PTI experts visited the sites to collect and consolidate the network data together with Titan engineers. Interviews were organized to clarify the relevant operation scenarios which had to be handled by a new, optimized network concept.

With these findings a network model of the plants was created in the Siemens power system planning software PSS®SINCAL.

In a second step the performance of the network was evaluated based on the current capacity of the equipment under normal operation, i.e. (n-1)-condition, for the actual and forecasted future loads. Overloaded equipment and undervoltages were identified and, based on the results, possible mitigation measures were determined. These measures also took into consideration the short-circuit stresses due to maximum short-circuit currents.

“Siemens PTI delivered a comprehensive project report. The study results provide valuable information and verified measures for further improving our power system’s reliability.”

Amaxopoulos Christos, Electrical Department Manager, Group Engineering & Technology,
Titan Cement Company S.A., Athens

In some cases reinforcement measures for old switchgear or the application of short-circuit limiting devices were recommended. These measures also influence the protection concept, which has to take into account the selectivity, but also the speed and therefore minimum hazard for the personnel in case of arc flash.

Against this background, the SIGUARD® PSA method was used to analyze the protection system performance for the existing network structures and the installed equipment. The delivered protection and the arc-flash hazard analyses provided both selective protection to maximize the reliability of supply and fast protection to limit the arc flash hazard.

In parallel, Siemens PTI's power quality experts visited the sites to measure the voltage harmonics and the related harmonic sources to derive measures. The improvement of the quality of power supply was of major importance to Titan, because both the increased application of variable speed drives with frequency converters and var

improvement measures can both lead to voltage dips. Siemens PTI's solution included the design of filters as a mitigation measure. All results were presented and discussed on site with Titan to coordinate the next steps.

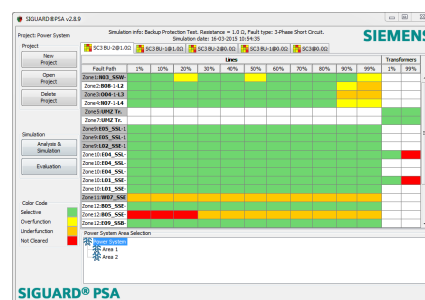


Figure 2: SIGUARD® PSA solution for the systematic and efficient performance analysis of the protection system and settings

In addition to the power system study, Siemens PTI held workshops for the know-how transfer to Titan engineers and provided them with the PSS®SINCAL network model to enable Titan to continue the relevant analyses. Nonetheless, the local Siemens

entity and the Siemens PTI engineers will continue to support Titan in the future.

Key achievements

The main benefits of the systematic protection system review and improvement project included:

- complete data survey, documentation and modeling of the power and protection system with validated high quality
- assessment of the performance of the existing system showing its specific characteristics, behavior, weak points and limitations
- development of new improved network structures with respect to reliability, power quality, protection and personal safety
- recommendations for the efficient future strategic development
- know-how transfer and staff education through workshops and customized training

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