



## PRODUCT APPLICATION NOTE

### Surface Coal Mines Protection

#### Protect Surface Coal Mine Critical Equipment from Power Surges

Rayvoss® surge protection systems featuring Strikesorb® technology protect industrial mining equipment from power surges, drastically reducing maintenance and operations expenses.



One of the largest surface coal mines in Greece is located in Megalopolis in the southern part of the country. It is owned by the Public Power Corporation of Greece (PPC) and it supplies lignite to the adjacent power plant that accounts for roughly 15% of the country's electricity production.

In this coal mine, 10 bucket

wheel excavators are used for the continuous, selective mining of lignite. Conveyor belts with a total length of 43 kilometers are used for transporting the excavated lignite to the stockyards and the waste to the dumping sites. Hundreds of kilometers of power cables of different lengths and types are used throughout the mine.

#### The Challenge

The Megalopolis mine operators had been experiencing recurring failures of the PLCs that control the conveyor belts' motion. These failures were due to a combination of lightning surge events and switching-related overvoltages. Since conveyor belts are an integral part of the coal mine, their immobilization was causing the production to stop. Tons of lignite had to be unloaded from the conveyor belts before they could be inspected and repaired. During this repair process the lignite had to be transported to the power plant via a fleet of rental trucks. This procedure could take from several hours up to a full week.

The total cost of the restoration process was overwhelming. The expenditure for renting the trucks alone amounted to \$450,000 US dollars annually. The engineering department of the mine had made countless efforts to solve the problem. Surge protective devices (SPDs) from practically every available supplier in the market had been used. All had failed, leaving the coal mine unprotected for a period of years.



Bucket wheel excavator with conveyor belt



# Raycap



INNOVATING POWER PROTECTION WORLDWIDE

## Solution

Raycap has a long-standing relationship with PPC and has provided them with a broad range of products. During a visit to the mine, Raycap's representatives were informed about the failures the site had been facing. The engineering management of the coal mine agreed to perform a field trial with four Rayvoss systems installed at the most problematic locations. The results of this field trial were immediate: those four initial installations proved the efficiency of Rayvoss in containing power surges as shown from the measurements depicted in the representative diagrams of Figures 1 and 2.

The field trial lasted for a whole year. During this period no damage of the Rayvoss

units or equipment failure was reported. The situation in the rest of the mine installations (using conventional protection systems or no protection at all) remained the same.

The management team of the mine as well as the general manager of the mines division

of PPC and his staff were so pleased by the unexpected solution to their long lasting problem that they decided to proceed with a purchase of 110 additional Rayvoss systems, in order to protect every possible point of failure in the Megalopolis coal mine.

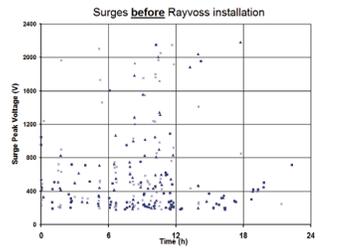


Figure 1: Power line transient overvoltage up to 2300V, in a conveyor belt PLC controller, measured in a 24 hour period before installing Rayvoss.

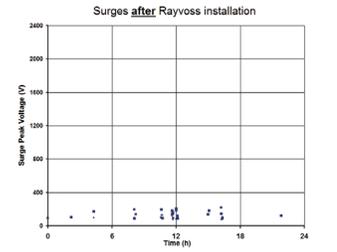


Figure 2: Power line transient overvoltage in a conveyor belt PLC controller, measured in a 24 hour period after installing Rayvoss.

## Conclusion

The comprehensive installation of Rayvoss units in Megalopolis enabled continuous and maintenance-free operation of the mine. The net present value (NPV) of the savings realized for a period of ten years will exceed \$4.8 million US dollars, and the payback period of investment in Rayvoss installations throughout the mine has proven to be as short as nine months.

“ Rayvoss surge protection systems provide the ultimate electrical protection to telecommunication, IT, industrial, medical and military infrastructure. Strikesorb, the surge suppression module found at the core of Rayvoss systems, is a high surge capacity protection element able to efficiently manage surge currents up to 200kA. Rayvoss systems offer maintenance-free protection and are perfectly suited for mission-critical applications in rugged environments. ”



Rayvoss installed on a conveyor belt

### Strikesorb Benefits

- Maintenance-free operation
- Safe operation: No smoke, fire or explosion
- Unique capability to withstand multiple high-energy transients
- Low let-through voltage, therefore providing excellent protection compared with competitive SPD products
- Class I/Class II compliant SPD per IEC 61643-11
- Global standards compliance: UL 1449 5<sup>th</sup> Edition, IEC, IEEE, NEMA
- Extended life cycle with a 10 year global product warranty
- Ease of installation

### Rayvoss family of products

**Raycap is a trusted partner, providing maintenance-free electrical protection solutions for mission-critical applications in hundreds of thousand installations worldwide. For a detailed presentation on how Raycap's Strikesorb-based Rayvoss mining solutions or others like them can be implemented contact a local dealer, distributor, integrator or Raycap today!**

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