

Give Your Remote Continuous Mining Machines a Voltage Boost!
Technology Update – Underground Voltage Support Systems for Underground Continuous Mining Machines

Abstract.

This paper introduces a new application of a proven technology to provide dynamic, voltage regulation in underground mine electrical distribution systems. This technology acts to “stiffen” the electrical power feeding continuous miners and generally raise and improve the voltage regulation at the continuous mining machines which may be located over long cable distances from the mine incoming electrical substation.

This is extremely valuable for large underground continuous mining operations that use high power electrical mining machines fed over very long cable lengths (measured in 10s of km, from mine shaft to mine operating face). This new technology provides fast acting dynamic voltage regulation (voltage support) while starting continuous borers and extensible conveyor belts. Additionally, if the mine suffers from a lower distribution voltage due to long cable lengths, this new technology will raise the overall voltage at the mining machine, which can increased mining machine production and lead to longer motor life.

The technology is based on voltage source converters operating as static VAR compensators specially packaged for the harsh underground mine environment. While static VAR compensator technology has been successfully used in utility and large industrial applications for many years (including open pit mining and arc furnaces), it has not (until now) been applied in underground mining.

The paper will present the problem of poor voltage regulation in underground mines on weak electrical utility networks. It will then discuss some of the alternatives that have been used to resolve this voltage problem. It will then introduce the new technology used to solve the problem and review the issues involved in using this technology in the harsh underground environment. Finally, the paper will present preliminary performance results from an actual installation in a large underground continuous mining operation in Canada.

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