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Increase Mine Safety with Fiber Optic Communication and Monitoring Systems by Conspec Controls

Article published on July 3rd 2012 | Technology

There are few people in the world who understand all of the risks that coal miners have to take, every day, in order to gather the large quantities of the fossil fuel necessary to provide energy across the United States. Carbon dioxide, carbon monoxide, hydrogen, hydrogen sulfide, methane gas, nitrogen dioxide, and sulfur dioxide are all deadly gases that can take the lives of miners with little warning or sign of their very presence in the surrounding area. The majority of those gases are also flammable, increasing the risk that miners are exposed to when they utilize electrical equipment or gas-powered vehicles. All of the above gases also occur as a part mining procedure, requiring extensive measures to be taken to safely ventilate a coal mine to prevent mine fires or explosions.

This ventilation is critical in ensuring the safety of a mineâ€™s workers and the failure of this ventilation is a catastrophic problem that can lead to the loss of human life. In 2001, during the Jim Walter Resources Mine Disaster, an explosion caused by a pocket of methane gas igniting due to contact with a battery charger damaged in a recent roof collapse ruined the ventilation system of Four Section allowing for flammable methane gas to build up to lethal concentrations once more. A second explosion occurred that resulted in the death of thirteen miners, a terrible accident that could have been averted.

Even outside of the context of an accident or emergency, safe and reliable communication is of paramount concerns for coal miners. Proper communication can often mean the difference between life and death as the control room is relied upon to inform miners of the conditions of their work areas. If the ventilation system stutters, dangerous gases begin to build up, or the structural integrity of the mine is reported, itâ€™s up to the people in the control room to inform the miners of what needs to be done to get the job done safely. That means that lines of communication always need to be ready and thatâ€™s no small task when that communication happens under tons of dirt and rock which can stress cables and wires to the breaking point. Recently mines have begun to make the switch to using fiber-optic cables, specially designed for reliability and resilience underground and in mines, that lower the chances of an unfortunate ignition of flammable gases or coal dust that may be present in the area should the cables be damaged.

These cables also have the benefit of allowing Atmospheric Monitoring Systems (AMS) to â€˜piggybackâ€™ on communication lines, and vice-versa, which cuts down on the cost of the installation o a separate network for either the AMS or communication. Some components of fiber-optic AMS are even built to measure and manage the power running through itâ€™s part of the network, often regulating the available power down enough so only a pre-set number of devices can be run which can help in reducing the chance of a power surge taking out precious mine equipment. Others are designed with built in battery supplies that ensure that the system is always ready for use should power be lost, automatically shutting down before the battery is completely drained so the Outstation is ready for use the moment power is restored. Many of these innovations reduce the costs of a mine to operate and provide a safer work environment for the miners themselves, perhaps the greatest incentives for their continued use.

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This article is provided by a www.Conspec-Controls.com - A gas safety company that specializes in a Mine Radio Systems.

Article Keywords:
Mine Radio Systems, Coal Burning Power Plants, Fiber Optic Communication, Mine Safety Equipment, Detector Combustible Gas

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