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Alternative Transport in Mining

The project under review is discussed as a hoisting and transport alternative for deep mines. Alternative haulage system is important at greater depths. Lithium batteries, fuel cells and hydrogen power will also see their day. It is necessary to preserve the flexibility of diesel loading and trucking but replace the diesel with another source of stored energy.

Trolley-wire or rail-pantograph electric systems for trucks have a high capital cost and greatly reduce operational flexibility, and for that reason have never caught on. Railway systems, either trolley wire or battery, are inflexible and incompatible with most modern mining practices. Monorails are more flexible and could be more widely used in small mines, but will not have the capacity to replace truck haulage.

The break has come in the use of lithium ion batteries for electric cars, which can now outperform most internal combustion cars, although with limited range. It is not a problem of fast recharging or battery changing. Underground fast recharging is on the horizon. There will be a combination of trolley-wire power with on-board lithium ion batteries storage. Fixed recharging wires or rails in locations throughout the mine, and up the main ramp, will keep batteries topped up and provide extra power for the main up-ramp haul. The loaders and trucks will have the same operating flexibility as diesel units.

Massachusetts Institute of Technology have developed an experimental battery that charges about 100 times as fast as normal lithium ion batteries. The mining industry has an opportunity through the use of fuelcells to enhance the health and safety of underground traction power. Conventional power technologies-tethered (including trolley and diesel) and not simultaneously clean, safe and productive. Diesel vehicles are more mobile and theoretically more productive, but their compliance with government-mandated emissions controls reduces actual productivity, and even their abated emissions may present a hazard to miners' health.

A fuelcell-powered mine vehicle incorporates the best advantages of electric and diesel-powered vehicles while avoiding their disadvantages: it combines the workplace environmental benefits of a battery vehicle with the energy density and mobility of a diesel.