

## Partner note

# Explosion proof mine monorail drive uses ABB technology

The Donbass coal mines in Ukraine use rope monorail roads to transport people and loads along the mine tunnels.

Based on a friction pulley driving a continuous rope, the rotation of the pulley was, until recently, achieved by using a slip-ring motor. The speed of this motor was controlled by a liquid rheostat, a type of variable resistor based on a tank of salt water, in the rotor circuit. This form of motor control is inefficient and does not allow smooth acceleration and deceleration. It is also difficult to maintain such a distributed control scheme.

### Drive designed for harsh mine conditions

To improve this arrangement, the Donetsk Engineering Group, an ABB authorized technical partner, developed a low voltage AC drive to run the rope monorail. Designed to cope with the harsh environment of the coal mines, the rope monorail drive is installed in an explosion proof enclosure, cutting the risk of igniting the coal dust and methane present in the mine.

Based on the ABB industrial drive and controlling a squirrel cage induction motor, the rope monorail drive allows speed control of the monorail system in driving and braking modes, as well as control of the mechanical brake.

### Soft start reduces motor stress

The rope monorail drives move multi-ton loads in the coal mines, hauling trucks over the 2 km length of monorail road. Driving a 75 kW motor, the average power consumption of the drive is only 10 to 12 kW.

The rope monorail drive allows soft start of the motor, together with a programmable ramp up period to reach the speed reference value. With a speed control in the range of 0.1 to 2.4 m/s, it automatically maintains the speed of the driving motor while the load is being changed and also allows contactless speed reversal of the motor.

Electrical braking of the motor is also provided, with electrical energy regenerating into the supply network. There is also programmable control of the monorail electrical-hydraulic braking. Protection functions supplied include short-circuit, overload, loss of phase, and braking resistor overheating.



An ABB industrial drive is installed within an explosion proof enclosure.

### Challenge

- Precise, smooth, reliable and energy-efficient operation of the rope monorail road motor in the coal mine

### Solution

- Dedicated rope monorail drive, based on ABB industrial drive installed in completely explosion proof drive cabinet

### Benefits

- Using ABB industrial drives as the basis for the application produced a complete drive solution that met all the requirements of the mine's rope monorail roads
- Reliable ABB industrial drives provide low failure operation with high efficiency and power factor
- Robust cabinet resists harsh conditions of the coal mines

## Technical specification

### Operating conditions

- Relative humidity: 100 percent at +35 °C
- Coal dust level: up to 1000 mg/m<sup>3</sup>
- Operating location: horizontal, acceptable deviation up to 15° in any direction

### Functions

- Soft start of the motor with the programmable ramp time to the speed reference value
- Speed control in the range of 0.1 to 2.4 m/s
- Automatic speed control of the driving motor while static load changing
- Contactorless speed reversing of the driving motor
- Electrical braking of the driving motor, with electrical energy regenerating into the supply network
- Programmed control of the monorail electrical-hydraulic braking

### Technical data

- Explosion protection marking – Exd I
- Environment protection degree – IP54

### Donetsk Engineering Group and ABB drives

Donetsk Engineering Group was founded in April, 1995 in Donetsk, Ukraine. The company is a production enterprise engaged in designing and manufacturing different kinds of industrial electrical equipment for coal-mining, oil-refineries, chemical and other industries, including explosion-hazard operating conditions.

The company provides:

- Energy appraisals with consequent implementation of energy saving technologies, such as drives
- Solutions for different applications in a wide range of industries
- Commissioning of the delivered equipment and future maintenance

Since 2007, the company has been an authorized member of the global ABB technical partner network and provides consistent quality in sales and support for ABB drives. The company has in-depth knowledge of local markets and is conversant with the ABB low voltage AC drives products and processes.

To ensure consistency and quality of its offering, Donetsk undergoes regular training and auditing. Working together, ABB and its partners strive for continuous quality improvement for products and customer services.

The partners are dedicated to helping customers with low voltage AC drives and motors related issues to improve process efficiency, and offer support wherever and whenever it is needed.



All electrical equipment is protected from the hazardous mine environment to IP54.



An ABB industrial regenerative drive forms the heart of the rope monorail drive.

For more information please contact:

[www.abb.com/drives](http://www.abb.com/drives)

[www.abb.com/drivespartners](http://www.abb.com/drivespartners)

[www.abb.com/MyABB/Partners](http://www.abb.com/MyABB/Partners) (extranet for members)

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