

POWERMINE®
CUSTOMIZED CABLE SOLUTIONS
FOR RELIABLE AND EFFICIENT
MINING OPERATIONS





EFFICIENT AND SUSTAINABLE MINING REQUIRES...

In keeping with its cyclical nature dependent on world manufacturing, the mining industry has seen the price of metals and minerals rise, driven by re-stabilized commodity prices and re-emerging demand from China, India and other emerging/manufacturing nations. In fact, mining is expected to grow by some 5 to 7% annually for the next five years, positively impacting production and exploration worldwide.

Russian companies are expanding open cast and underground mining, especially in the Siberian-Ural region. Australia is producing a wide range of minerals, including iron ore, copper and gold, and increasing its coal exports to Asia. Meanwhile, South American countries (Brazil, Chile, Peru and Argentina) are positioning themselves as world leaders in the production of copper, steel and aluminum, while Canada continues to play a leading role in domestic and international mining, and Africa is steadily growing in importance.

Sustainability is a concern, not only in terms of protecting present and future geological assets, but also in obtaining public support in a sector which raises questions about biodiversity, water-usage, climate change, energy-sharing, international cooperation, and the development of public transport and communications networks.

As a mining company, you are focusing on long-term growth, as well as short-term gains. You would like to enhance your operational viability and social legitimacy, and this can only be done through modernization, industrialization and automating your infrastructure, always with worker and environmental safety in mind. Since cables are the only means of getting power to your electric mobile machines, they play an important part in your strategic planning.



What mining companies expect:

- Wide range of cables for all mining applications (power, control and data)
- Turnkey solutions to allow the complete outfitting of a mine
- Ruggedness, flexibility and longevity in very harsh environments
- Pre-terminated cable assemblies for fast installation
- Full compliance with world standards, including UL, CSA and MSHA
- Lab test services and on-site inspection
- Cable repair workshop and facilities (24/7 hotline)



...**POWERMINE**[®] RELIABILITY, PERFORMANCE AND SUPPORT

To meet the extraction, loading and transport challenges of today's mining companies, Nexans has developed POWERMINE[®] cables and cable solutions for both underground and open cast sites. Since high performance and reliable support are essential to economic efficiency, Nexans also provides numerous services based on our proven experience in the mining market.

Underground coal cutter cables offer fire-resistance, durability and tensile strength, while loader/scooper cables allow electric trucks to travel long distances in galleries when conveyers are unavailable. Shaft and gallery cables are designed for easy installation and superior fire-performance to protect personnel and equipment. Drilling and tunneling cables give boring machines greater autonomy. Open cast cables absorb impact from trucks and machinery to guarantee non-stop power supply and reliable control for conveyers, excavators, pontoon-mounted dredgers, electric shovels and draglines.

For both kinds of mining, optical fiber/copper can be integrated for remote control, surveillance and monitoring, often using an active switch system to provide Power over Ethernet (PoE) to vital equipment. Nexans has also developed submersible cables to handle groundwater drainage, and fluorescent/reflective cables to guarantee the nighttime visibility of exposed cable. Mining-related services include testing, onsite repair, training for personnel, and programs to support environmental and social values.

Since easy-to-reach deposits are being depleted worldwide, exploration has moved farther afield to remote locations, often with desert or freezing conditions. Nexans high-performance cables are designed for challenging environments, and we can also advise about infrastructures beyond "pure mining applications" which are increasingly the responsibility of mining companies: like private communications and data networks; self-contained electrical power distribution; short-link rail infrastructure; and material handling facilities for loading centers and ports.

POWERMINE[®] **for operational excellence and safety**

- Reliable, customized cable solutions to increase economic efficiency
- Built-in safety to handle short-circuits, fire, abrasion, impact, crush/breakage
- Designs for long freehanging installations, extended links, and tough conditions
- High flexibility for the very mobile mining environment, underground and open cast
- Technical support for system engineering, fast-delivery, installation and problemsolving
- Pre-terminated sets, harnessing, splicing, onsite-repairs and maintenance
- Advanced testing facilities to ensure durability and worldwide certification

POWERMINE® CABLE SOLUTIONS AND SERVICES FOR

UNDERGROUND SOLUTIONS

Coal cutter cables



These customized ≤ 3 kV to ≤ 3.5 kV energy cables come in a chain and free-laying version, with optional control/monitoring conductors (including optical

fiber). They are fire-resistant and offer high abrasive resistance and tensile strength.

Ideal for connecting mobile cutting machines for coal or kali (salt) and potash which require a high bending load with low train stress. In Australia, Nexans has supplied the first and only 11 kV longwall cable in the world.

Loader/scooper cables

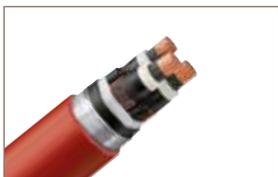


1-3 kV energy-only cables mounted on reels on electric trucks in hard rock underground mines which carry ore or potash in galleries (up to 300 meters

long) when conveyors are unavailable. They offer high tensile strength (≤ 70 kN) and exceptional abrasion resistance.

> Widely used in underground mines, these three-core cables incorporate a tough steel rope center and an anti-torsion braid for continuous reeling/unreeling.

Shaft and gallery cables

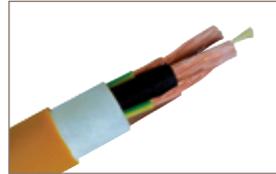


To facilitate installation, 10 kV shaft cables (with OF) are produced for free-hanging lengths up to 1,500 m while a new generation of gallery cables replaces PVC with

a halogen-free compound to protect people and equipment.

> Nexans delivered 60 km of large cross-section cables (400 mm^2) to a large project in the Ural-Siberian region in Russia. The cables can operate down to -40°C and were produced and delivered in a record three months.

Drilling and tunneling cables



D&T cables (BUFLEX®) are sheathed in flame-retardant polyurethane. Due to reduced diameter, more cable can be installed on mobile drill reels, allowing

considerably longer travelling distance (up to 100 meters).

> Nexans annually supplies 100 km of D&T cable to Sweden's Atlas Copco and Finland's Sandvik, leading manufacturers of mobile drilling machines.

OPEN CAST SOLUTIONS

Reeling cables



Similar to material handling cables, but larger ($\leq 185 \text{ mm}^2$), these flexible cables can endure truck tire impact and high mechanical stress over long distances (10–12

km) between power stations and excavators, dumpers, mobile crushers. A torsion braid surrounded by a tough compound in the other sheath prevents a "corkscrew" effect.

> Nexans has delivered up to 7 km per drum of reeling cable with integrated optical fiber for the conveyor bridge of the biggest coal mine in Germany (Vattenfall).

Trailing cables



Attached to mobile machines, they trail behind machines when they move. Applications include continuous miners, shuttle cars, bucket wheel

excavators, electric shovels and draglines. To provide 36 kV power along conveyor belts, these flexible cables are designed with a double sheath and with optimized wall thicknesses which allow them to handle the vibration and mechanical stress of moving applications.

> 22 km of 185 mm^2 trailing cables with a cold flexible outer sheath were delivered to a German open cast mine on drums of 1,000 m of cable each.

TODAY'S DEEP AND SHALLOW MINES



Waterproof cables



Waterproof trailing cables are used between the power station and pontoon-mounted diggers, dredgers, floating docks, etc. They can be used in slop, salt and

brackish water or in water-laden open cast mines.

> To minimize the environmental impact of runoff streams and metal-laden wastewater, these cables are widely used in German water treatment plants, and in a South African open cast gravel pit.

Dragline cables



To meet the enormous electrical power needs (typically 6.6, but increasingly 22 kV) of giant dragline excavators, Nexans (Olex Australia)

has developed a flexible dragline cable with exceptional abrasion resistance and toughness.

> Ten lengths of 305 m long 22 kV dragline cables were supplied to the Peak Downs Mine in central Queensland, while similar sets outfit mines at Ensham and Curragh in the same region. Dragline cables are also used by Hunter Valley #2 and others in New South Wales.

UNDERGROUND AND OPEN CAST SOLUTIONS

Optical fiber cables



Up to 24 optical fibers can be combined in the interstices of energy cables for communications, video surveillance, monitoring and data transfer. Incorporated

in 20 kV underground and 35 kV open pit rubber cables, fiber cables are light, with no signal loss and high electromagnetic compatibility (EMC).

> Nexans delivered special optical fiber cables with rubber sheaths for harsh environments in lengths of up to 5 km in one length on one drum.

Intelligent Ethernet switch systems



These small and rugged Ethernet switch systems contain up to 3 fiber-optic uplink ports and 8 twisted-pair copper ports. They can be used for all mine control

and monitoring applications, have inbuilt diagnostic functionalities, and can provide Power over Ethernet (PoE) to IP surveillance cameras and VoIP phones.

> Nexans switch systems are used for fiber-optic data communications in underground mining locations throughout Germany, especially in the Ruhr area.



Multicore control and data cables



These highly flexible, heavy duty rubber cables (0.6/1 kV) provide power and control for both underground and open pit applications to control engines on conveyor

belts, excavators, mobile equipment, etc. They can handle high mechanical load and operate in both dry and damp areas.

> More than 2,500 km of this kind of cable are produced for the mining market worldwide annually.

Submersible pump cables



Nexans manufactures diverse high-tensile round and flat pump cables for drinking water, waste water and hot water (up to 90°C) and to lower groundwater for

underground and open cast mines.

> Reliability and high quality are two reasons customers order more than 200 km of pump cables every year.

Fluorescent and reflecting cables



To protect cables from being accidentally crushed by trucks, Nexans ICEA-compliant fluorescent cables gather sunlight to glow in the dark, while reflecting cables

reflect light from electric lamps and headlights. Aside from high tear/abrasion resistance, transparency makes it possible to spot mechanical or electrical breaks in the cable cores.

> Nexans fluorescent cables are used in Chile's Minera Escondida, a copper mine with the largest output in the world.



SERVICES

Repair and emergency service



As a part of a complete, round-the-clock package, in many parts of the world, Nexans offers a 24/7 Repair and Emergency Service available via a

dedicated hotline to provide expert advice, technical support and even professional onsite intervention to avoid breakdowns and keep mines operating.

Training



Nexans organizes training sessions (including layout, installation, splicing and repair) for mining technicians and management personnel at all levels in Australia,

Russia and South Africa, etc. Training is provided both on our premises and through travelling seminars.

Environmental protection



From the retrieval of wooden delivery drums, to the replacement of materials (like lead), Life Cycle Assessment, energy management, and cable retrieval-disposal-

recycling, Nexans is dedicated to creating a safer mining environment to benefit workers, the industry and the public-at-large.

Turnkey capability



With our broad range of dedicated mining cables (energy, data and specialized applications) and our extensive expertise in testing, design,

engineering, project planning, installation, logistics, repair and maintenance, Nexans can add value at every level to outfit a complete mine.

NEXANS POWERMINE® FOR SUSTAINABLE MINING

GLOBAL EXPERTISE

In addition to conforming to mining standards worldwide, we have developed partnerships with customers, often customdesigning special cables together. Through our 24/7 Call Center we support all applications, drawing on the expertise of our test centers in Lyon (France) and Mönchengladbach (Germany).

LOCAL PRESENCE

Apart from our global distribution network, we have a strong presence in local markets to assure appropriate customer solutions, training and technology

transfers. We have extensive plant facilities in Europe, Australia, Southeast Asia, and the Americas to directly serve new mining developments.

INNOVATION

Nexans is constantly striving to replace expensive raw materials with cheaper, better, and more environmentallyfriendly compounds (e.g. synthetic rubber). Through constant innovation, we are helping mining companies everywhere to upgrade methods, equipment and infrastructure.

Nexans brings energy to life through an extensive range of cables and cabling solutions that deliver increased performance for our customers worldwide. Nexans' teams are committed to a partnership approach that supports customers in four main business areas: Power transmission and distribution (submarine and land), Energy resources (Oil & Gas, Mining and Renewables), Transportation (Road, Rail, Air, Sea) and Building (Commercial, Residential and Data Centers). Nexans' strategy is founded on continuous innovation in products, solutions and services, employee development, customer training and the introduction of safe, low-environmental-impact industrial processes. In 2013, Nexans became the first cable player to create a Foundation to introduce sustained initiatives for access to energy for disadvantaged communities worldwide. Nexans is an active member of Europacable, the European Association of Wire & Cable Manufacturers, and a signatory of the Europacable Industry Charter. The Charter expresses its members' commitment to the principles and objectives of developing ethical, sustainable and high-quality cables. We have an industrial presence in 40 countries and commercial activities worldwide, employing close to 26,000 people and generating sales in 2015 of 6.2 billion euros. Nexans is listed on NYSE Euronext Paris, compartment A.

Nexans

8, rue du Général Foy - 75008 Paris - France
Tel. : +33 (0)1 73 23 84 00 - Fax : +33 (0)1 73 23 86 38
www.nexans.com/powermine
marcom.info@nexans.com