



Mining Industry

Robust Industrial Data Communication Solutions



Westermo provides secure and future-proof solutions for the mining industry

Historically the Mining Industry has been the driving force behind the South African economy. It is likely that it will remain that way for years to come.

The Southern African region is fortunate to be endowed with a variety of naturally occurring minerals that in many cases appear in huge volume. Getting these minerals extracted from the ground and the resultant beneficiation is dependent on a vast array of machinery and automation systems. These systems need to be linked and report back to operational staff and management.

Westermo provides secure and future-proof solutions for the mining industry.

Continuous modernisation of the industry is crucial in order to maintain the adequate supply of minerals for local and worldwide consumption. Future-proof automation and data communications within the sector is pivotal in improving operational efficiency and safety. Rugged equipment such as Westermo's Ethernet Switches, for the mining sector, play a vital role in underground, surface and mineral processing, where they are used to link and monitor extensive automation and control facilities.

Mining companies are looking more closely at their safety processes and regulations, finding places to improve and working to ensure the safety of their employees, machinery and the environment. The mining industry can succeed only with the use of high-end technology, as featured in Westermo's product lines. Major mining companies rely on Westermo to recommend the right solution to ensure that their production stays at full capacity and on schedule and that they manage their networked systems in hazardous and extreme environments in the best possible way.

The following product characteristics are representative of the high standard achieved by Westermo:

Safety: ATEX, IECEx approvals

Robustness: Capable of withstanding extreme temperatures, humidity, shock, vibrations and EMC

Reliability: With Westermo's Operating System (WeOS), a fast network recovery is guaranteed, avoiding any unacceptable downtime

Future proof: All products are designed to accept any future upgrades

Interoperability: Westermo's products are tested together with a wide range of devices available on the market in order to ensure operational harmony in any given network

Redundancy: Redundancy is achieved through Layer 2 Management (Ring, Ring Coupling, Dual Homing and Horse Shoe Topologies) as well as redundancy on the power supply connection are standard features

Operational savings: Low power consumption translates into lower operational expenses

Capital savings: A healthy mix of media features guarantees a reduced and manageable investment

High-end quality: All products are produced in-house using industrial grade components and comprehensive testing is carried out





WeOS – Westermo Operating System

Westermo delivers resilient network solutions through its WeOS operating system, which is at the heart of our range of robust hardware platforms.

WeOS provides an extensive suite of IP networking standards allowing resilient and flexible networks to be created. Fast recovery times and highly reliable solutions can be achieved even in very complex networks. WeOS also provides multiple layers of security to provide protection against cyber-attacks at the network edge.

Simple and flexible configuration

Made Easy is at the core of the WeOS development, which is why we ensure our intuitive command-line interface is logical and our web interface is simple to use.



WeConfig – Networking made easy

WeConfig is a network configuration management tool that makes it easy to configure single or multiple Westermo devices. WeConfig simplifies both the initial installation of a network and ongoing maintenance once commissioned.

Easy replacement and reconfiguration

Project files store all associated backup files and network topology information. These enable fast and easy replacement and reconfiguration of a damaged switch in the field. A new device can be installed and will automatically be discovered on the network by WeConfig. The configuration file of the old unit can simply be restored from the project file and the network is repaired.

Configuration, monitoring and diagnostics

To achieve network resilience, Westermo devices are automatically reconfigured. In the event of a network failure processes running on the network are therefore unaffected. Because processes are not interrupted, the user might not be aware that a network failure has occurred. WeConfig graphically displays the failed link as well as record of the time.



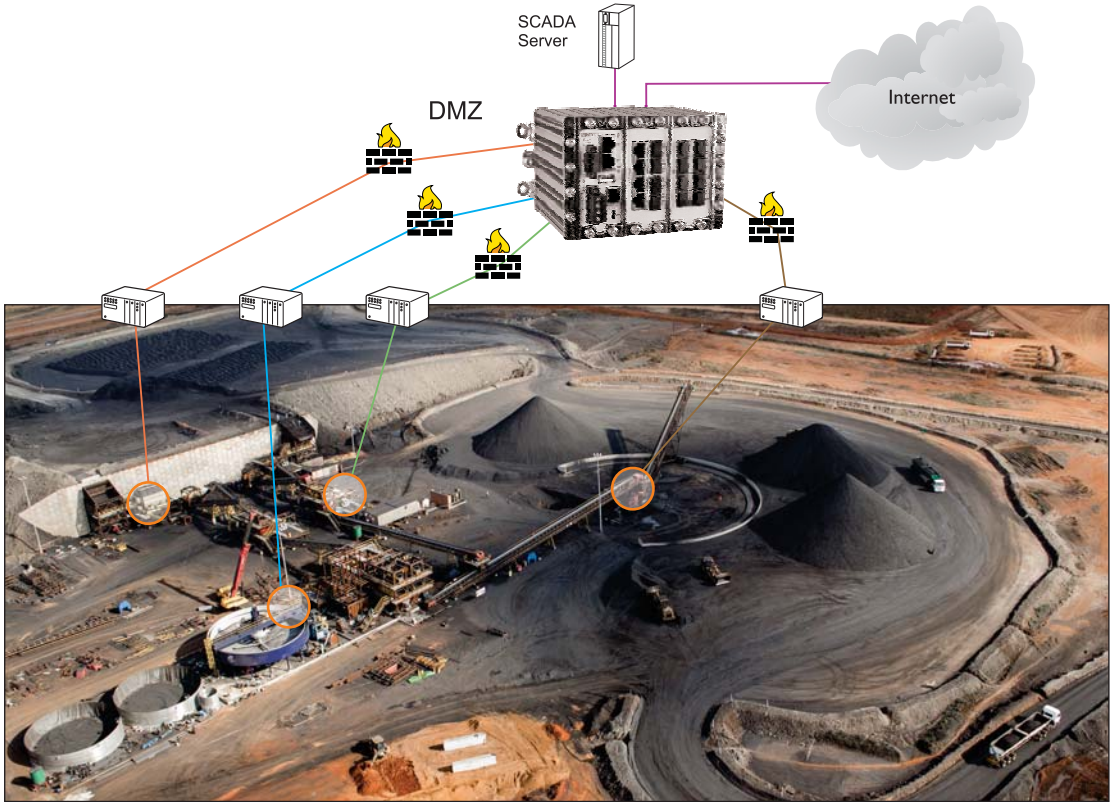
Designed to meet the harsh requirements of the mining industry



Thermal management

Heat management is an important tool used by many of Westermo's products in increasing heat dissipation and maintaining an acceptable temperature level. This helps to optimize operational efficiency in extreme and fluctuating temperatures. Here are a number of Westermo features which help manage assailing temperatures:

- ⊕ Low power consumption.
- ⊕ High heat dissipation. This is possible with the application of industrial paste between the enclosure and the boards. Components capable of emitting higher levels of heat are targeted.
- ⊕ The industrial grade components used ensure that the products are operational under wide ranging temperatures (-40 C to 70 C). There is no need for fans or holes in the device.



Security

The risk of intrusion is omnipresent and many of the recent cyber attacks which have targeted various international facilities have been very destructive and in some cases pushed production to a grinding halt for months.

- # DMZ (DeMilitarised Zone) security structures to be created.
- # Interface based firewalls: Ports or groups of ports can be divided and firewalls constructed between them.



Effective dust protection

Westermo offers solutions and products which are certified at ingress levels ranging from IP40 to IP67.

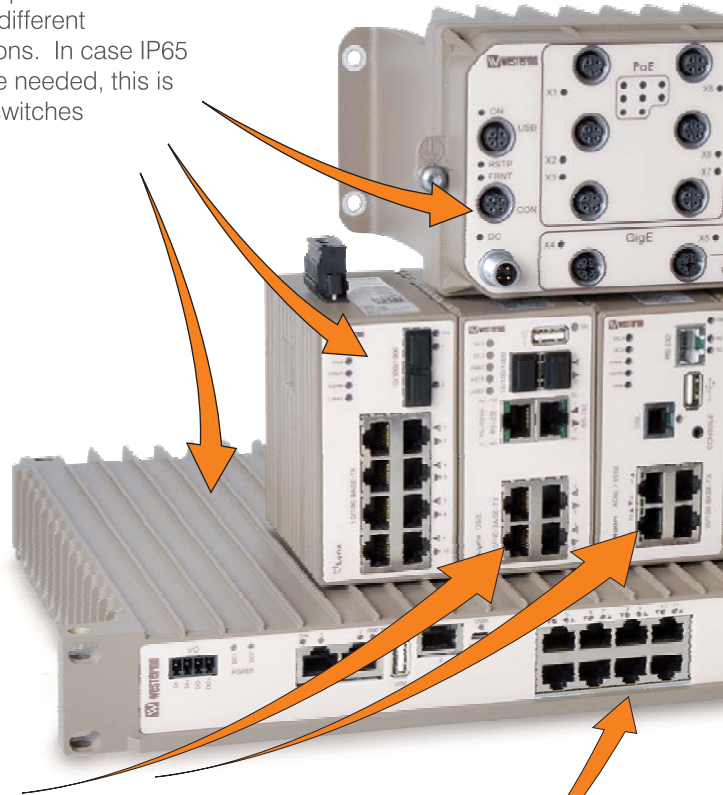
These ingress levels are generally higher than those offered by peers on the global market. The ingress of solid particles such as dust and particles, can not only be harmful to the equipment which would invariably affect operations, but it can also be dangerous to the operator.

Westermo Robus

Connecting Mission Critical S

Different switches for different demands

Ethernet switches for mining use have different demands. Lynx is the most compact switch on the market while RedFox offers different combinations of FX or TX solutions. In case IP65 housings or M12 connectors are needed, this is supplied by the Viper family of switches



Solutions for legacy applications

Legacy solution can be solved with verity communication solutions. We offer serial connectivity using PSTN modems, fibre optical modems, 3G/4G routers, Device Servers, Serial adaptors, Ethernet Extenders or Switches

19" industrial routing switches

The RFIR (RedFox Industrial Rack) is a high performance layer 3 industrial Ethernet switch designed for high network traffic applications. The RFIR is available in different port configurations and runs efficiently on AC or DC power. The design is robust and compact which makes it easy to mount into a 19" cabinet and therefore the RFIR range is perfectly suited for use both in control rooms as well as at the network edge (surface / underground).

Best Network Solutions

Systems in Industrial Environments

Long distance Ethernet on copper cables

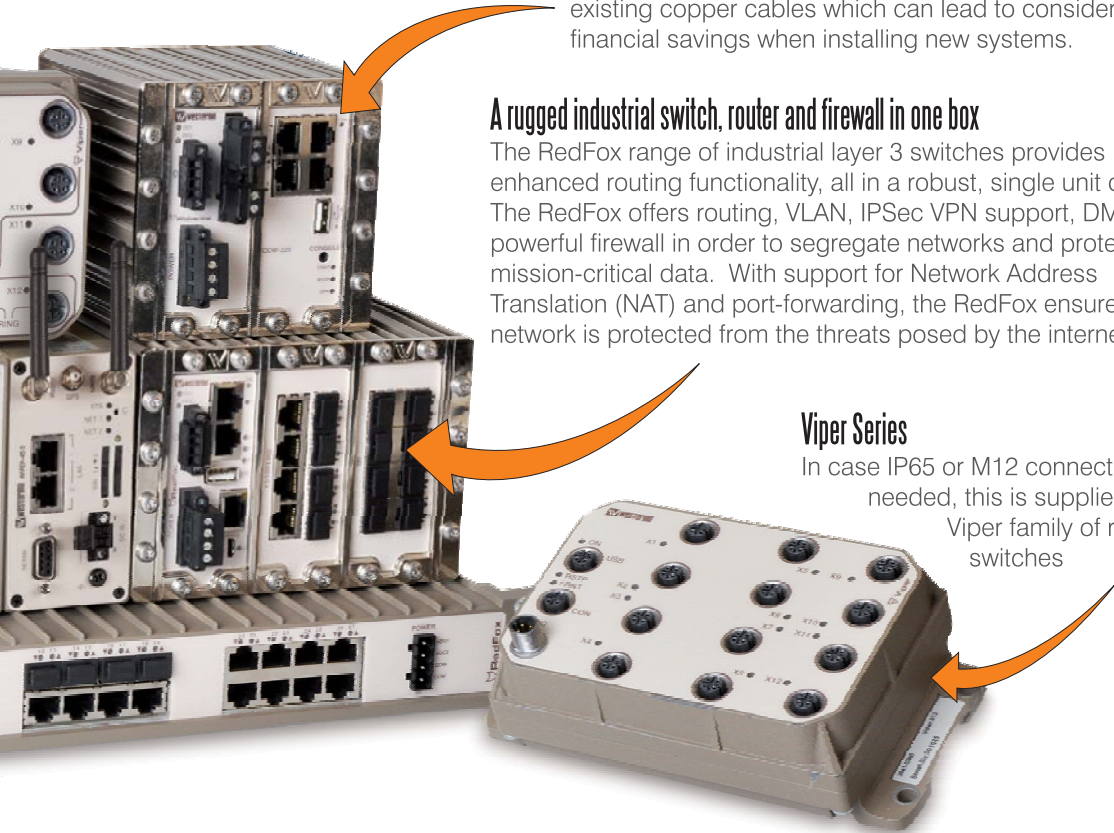
Westermo Ethernet extender technology based on SHDSL makes it possible to reuse many types of pre-existing copper cables which can lead to considerable financial savings when installing new systems.

A rugged industrial switch, router and firewall in one box

The RedFox range of industrial layer 3 switches provides enhanced routing functionality, all in a robust, single unit design. The RedFox offers routing, VLAN, IPSec VPN support, DMZ and a powerful firewall in order to segregate networks and protect mission-critical data. With support for Network Address Translation (NAT) and port-forwarding, the RedFox ensures your network is protected from the threats posed by the internet.

Viper Series

In case IP65 or M12 connectors are needed, this is supplied by the Viper family of rugged switches



WeOS



Continuously upgraded software solution incorporating functions to create resilient networks...

Robust hardware



...with the most reliable hardware on the market, designed for the most extreme environments...

Approvals



...tested by external test houses to meet industrial EMC, isolation, vibration and shock standards...

Network tools



...configured and controlled using 'made easy' software tools enabling increased availability and security.



Coal Mining

Application: Data communications to Continuous Miner, Environmental Monitoring Systems, Electrical Reticulation Control & Monitoring

Products: DDW-120, 142, 225/226

Why Westermo:

- # Use of copper for long distance and Flexibility
- # Rugged design / Layer 3 Routing capability
- # Serial IP conversion / Use of relays for resetting of underground equipment from surface



Gold Mining

Application: Communications to and between underground PLC / SCADA / HMI systems. Underground Camera Systems, Seismic Monitoring and connection to Underground Ventilation System.

Underground Personnel Information and Warning Systems.

Products: DDW-142, Lynx, Red Fox & Red Fox Rack

Why Westermo:

- # Use of copper for runs for quick re-termination in event of rock falls and wire breakage
- # Rugged design \ Layer 3 Routing capability / Multiple Ring Linking / Fast Reconfiguration of Rings



Platinum Mining

Application: Data communications to Environmental Monitoring Systems, Fire Detection & Control System. IO Systems for underground applications.

Products: DDW-142, 225/226

Why Westermo:

- # Use of copper for long distance and Flexibility
- # Rugged design / Layer 3 Routing capability
- # Serial IP



Diamonds

Application: Data communications to and between PLCs in Diamond Mining applications, as well as Routing (NAT 1-1) to network on Diamond Drilling Equipment.

Products: Lynx, SDW-500s

Why Westermo:

- ⊕ Ruggedness and temperature range
- ⊕ Products for multiple protocols



Copper Mining

Application: Data communications to Electrical Sub-Stations and Metering systems in DRC.

Products: Lynx, ODW-710 (Profibus)

Why Westermo:

- ⊕ Ruggedness and temperature range
- ⊕ Products for multiple protocols
- ⊕ Profibus, Modbus, Modbus TCP/IP



Data Communications to Heavy Mining Vehicles - Type of Mining: Coal and Iron Ore

Application: Data communications directly on to the Mining Vehicles (Heavy Load Trucks), for monitoring of engine systems and other on-board equipment for planned maintenance and fault monitoring system.

Products: MRD-355

Why Westermo:

- ⊕ Rugged Design
- ⊕ Dual SIM slots for multiple service providers
- ⊕ Ease of setup of routers
- ⊕ Fast ring recovery



Wolverine Series Ethernet Extenders - Robustness where most needed

The Westermo Wolverine Series of Ethernet Extenders have been used extensively throughout various types of Mining applications in Southern Africa. These include Gold, Platinum, Coal and others.

In many cases the units have been installed underground, where they have been used to extend networks to equipment that moves as the mining process extends into new portions of the ore body.

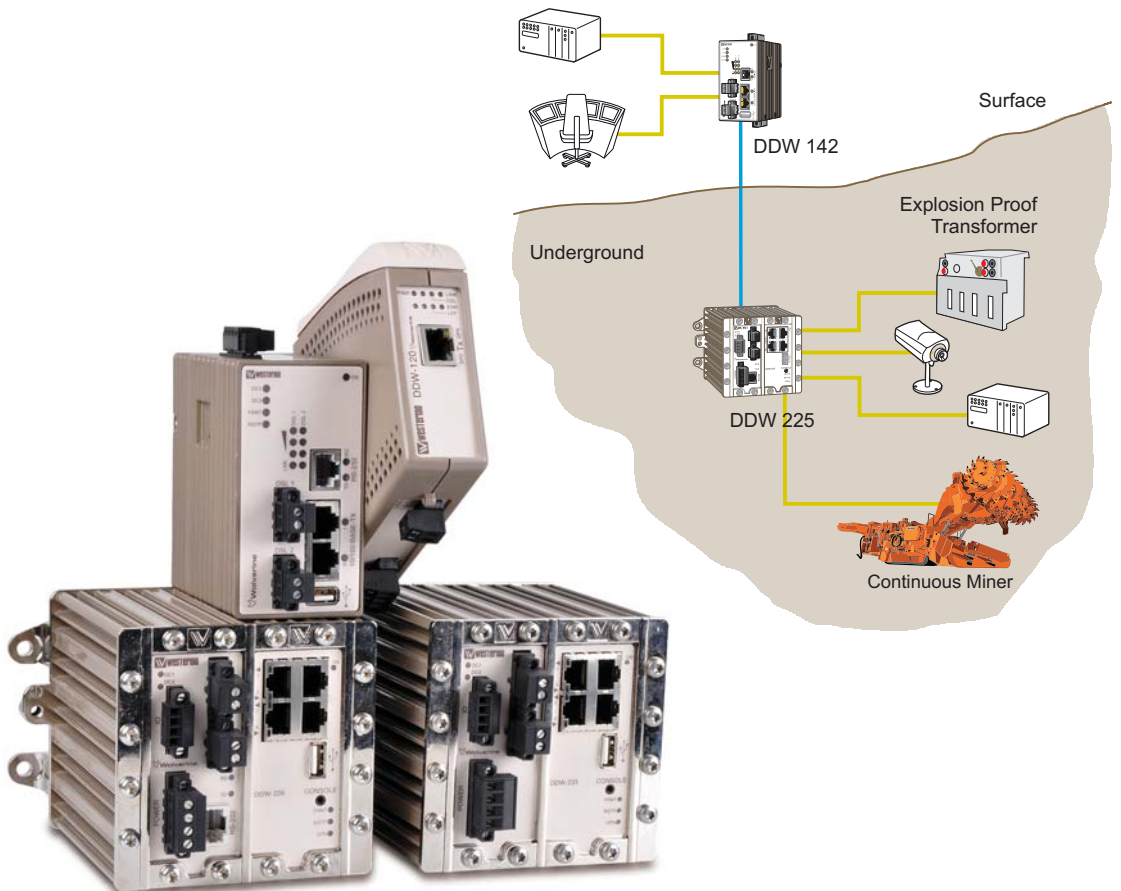
As they are installed deep underground, the copper lines they use are not as susceptible to transients from lightning as they would be on surface.

This is particularly useful in coal mining applications, where coal cutting machinery and ancillary equipment is constantly being moved to different locations or extended into existing sections.

Underground technicians are then able to connect copper termination points rapidly, where splicing of fibre connections would take specialised equipment and skills from the operational staff.

Splicing of fibres in these environmentally unfriendly areas can generate other issues.

With a whole range of units available from unmanaged versions as well as managed versions with Layer 2 and Layer 3 routing functions, as well as RS232 and RS-485 serial ports available, for connection to legacy equipment, the Wolverine series is ideally suited to a whole host of uses in mining and in many other applications.



Lynx & Ethernet Extenders (DDW) casing is of non-sparking alloy



The Westerno Lynx Managed Switches and Wolverine Ethernet Extenders (DDW-142/242) series of devices have a case made from an alloy called ZAMAK 5. This alloy has a high zinc content making the alloy non-sparking when struck with a ferrous metal. This is particularly important when operating in a coal mine or other areas where there is a potentially hazardous atmosphere. The alloy does not mean that the device can be openly mounted in a

hazardous atmosphere but it does mean that a flameproof enclosure can be opened as long as the power has been disconnected and the Westerno device replaced without the risk of an accidental spark. This could be a huge cost saving for a user who would normally have to bring the whole system to the surface or a safe area to change or even get access to the networking component.

Zinc alloys are non-sparking and suitable for hazardous location applications such as coal mines, tankers and refineries.

No. 5 alloy castings are marginally stronger and harder than No. 3. However, these improvements are tempered with a reduction in ductility which can affect formability during secondary bending, riveting, swaging or crimping operations. No. 5 contains an addition of 1% copper which accounts for these property changes. The alloy is widely die cast in Europe and does exhibit excellent castability characteristics, as well as, improved creep performance over No. 3. However, when an extra measure of tensile performance is needed, No. 5 alloy castings are recommended.

Strength & Ductility:

Zinc alloys offer high strengths (to 60,000 psi) and superior elongation for strong designs and formability for bending, crimping and riveting operations.

Toughness:

Few materials provide the strength and toughness of zinc alloys. Impact resistance is significantly higher than cast aluminium alloys, plastics, and grey cast iron.

Rigidity:

Zinc alloys have the rigidity of metals with modulus of elasticity characteristics equivalent to other die castable materials. Stiffness properties are, therefore, far superior to engineering plastics.

Swedish Engineering Excellence

Westermo provides a full range of data communications solutions for demanding applications in many industries. Since 1975 we have been at the forefront of technological development and continue to push the limits of what is technically possible.

Westermo offers the highest levels of service to help customers to select, configure and install the right solution for their needs. Our experience and expertise goes far beyond our own product range, so that regardless of whether your installation is in a substation, water treatment plant or alongside a railway, we understand the specific demands and are able to provide the right advice.

To provide the best support globally, we have local presence through our authorised distributors and Westermo offices in more than 35 countries worldwide.

Made in Sweden

To ensure the highest quality, all Westermo products are manufactured in our own state of the art industrial electronics manufacturing facility in Sweden.



Westermo 5 Year Warranty

To ensure the highest quality products, Westermo has a state of the art industrial electronics manufacturing facility in Sweden. To maximize the reliability of the product, testing is carried out at many stages of the manufacturing process.

To demonstrate this confidence in our products, all Westermo products are warranted against defects in design, materials or workmanship for a time period of five years.

- ⊕ Manufacturing to IPC-A-610 under ISO9001-2008 QMS
- ⊕ Solder Paste Inspection and Automated Optical Inspection
- ⊕ X-ray examination and PCB testing
- ⊕ Functional testing
- ⊕ Burn-in testing

THROUGHPUT
TECHNOLOGIES

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Problem Solved!*

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