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Highly responsive conveyor belt tracker improves production and safety worldwide

The pioneer in belt conveyor accessories has launched the next generation of tracking technology for a global marketplace. Martin Engineering designed the highly responsive Martin® Tracker™ HD (heavy-duty) belt conveyor alignment system with widely available plate steel to increase availability and affordability across all 6 continents it serves. A mistracking belt produces excessive spillage which increases labor costs for cleanup and may cause contact with the mainframe. This seriously damages both the belt and the structure and increases the potential for a friction fire. The Martin Tracker HD upper and lower units provide immediate, continuous, and precise adjustment of the mistracking belt. The result is greater productivity with less unscheduled downtime from both equipment replacement and spillage cleanup for a lower cost of operation.

"Since most OEM mistracking devices are only designed to prevent contact with the stringer and don't actually realign the belt, operators can spend a lot of time monitoring the system and adjusting idlers to achieve consistent alignment," explained Dave Mueller, Product Manager for Martin Engineering. "With enough manual adjusting, operators find that idlers must be recentered if there's a change in cargo characteristics or to install a new belt. The Tracker HD automates the alignment process, eliminating the need for constant monitoring and manual adjustments, reducing the labor and downtime for maintenance."

How It Works

The Martin Tracker HD's unrivaled precision comes from sensing rollers that ride either side of the belt edge and are attached to the end of an arm assembly. As the rollers detect slight variations in the belt path, the force of the wandering belt causes the arms to automatically position a pivoting idler in the opposite direction of the misalignment. The lever action requires less force to initiate the correction and only slight adjustments mean the consistent contact between the belt and idlers reduces the energy needed to bring the belt back into alignment.

"Certain countries can't buy the square tubing, so we're now manufacturing the equipment from readily available plate steel without any changes to the performance or life of the unit," Mueller pointed out. "This allows the Tracker HD to be produced and supplied across all global business units."

Compatible With Most Belt Conveyor Systems

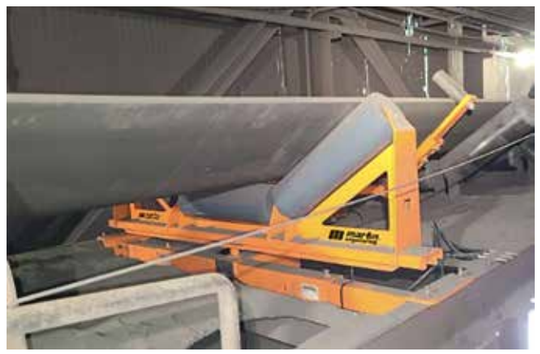
Easy to install and designed to withstand the stress associated with wider, thicker belts moving at higher speeds and carrying heavier loads, the Martin Tracker HD is suitable for a belt thickness up to 1.125 in. (28.5 mm) and speeds up to 800 fpm (4 m/s). Both the upper and lower units accommodate belt widths of 36-72 in. (915-1828 mm) with an effective tracking distance of 150 ft. (45.72 m).

Available in 20-, 35-, and 45-degree trough angles, there are options for the addition of a Martin® Trac-Mount™ Idler, which allows the entire troughed idler unit to be slid away from the mainframe and safely serviced from outside of the system by a single worker. This important safety element can considerably reduce the amount of labor and maintenance time for the replacement of broken or frozen idlers. Also available are rubber-lagged rollers on the lower tracker and a grease kit for both the upper and lower assemblies. The unit is not suitable for reversing conveyors, belts with substantial rollback, or paddle or chevron belts.

Proper Placement is the Key

It is recommended operators install Martin Tracker HDs after the load zone on belts wider than 24 in. (610 mm) with additional units placed down the system to keep the belt centered and tracking. By placing an upper unit before the discharge, operators ensure the belt is centered on the head pulley allowing for optimal belt cleaning with maximum cargo discharge.

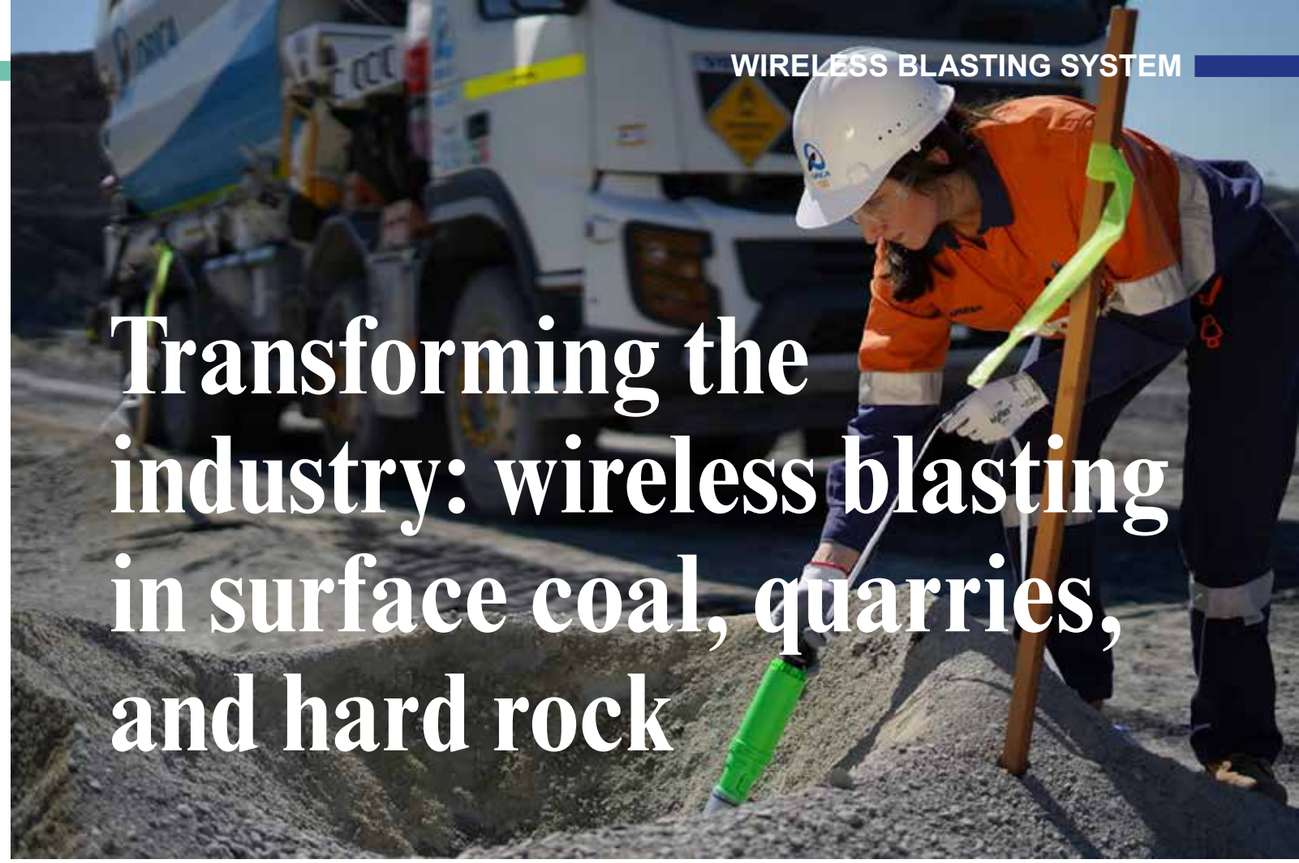
The lower tracker has been redesigned to include an extra safety feature not found in competitor units. Regardless of the conveyor, return rollers have been known to detach and drop, creating a serious safety issue, so the Martin Tracker HD has been equipped with safety guarding on the steering roll to prevent the roller from coming off or putting workers in harm's way. On the return, it is recommended to place a tracker after the discharge zone or take-up pulley, as well as periodically down the system depending on length. To ensure centered loading, the belt must enter the loading zone aligned, so installing a lower unit approximately five times the belt's width in distance from the tail pulley will support an efficient loading process.



Field Tested and Approved

Since the basic design of the Martin Tracker HD is similar to that of its predecessors with square tube construction, the testing focused on performance, durability and installation time. Tested in bulk handling operations including mining and cement where mistracking leading to spillage had historically been a concern, the unit performed up to Martin Engineering's high standards.

"Martin Engineering believes safety should be a core function in any conveyor accessory we design, and the Tracker HD is no different," Mueller said. "By automating consistent belt tracking, this solution reduces equipment wear, maintenance time, and downtime. These factors lower the cost of operation offering the best return on investment of any tracker on the market."



Transforming the industry: wireless blasting in surface coal, quarries, and hard rock

This year marks Orica's 150 years of investment in technology and innovation to deliver blasting products and digital solutions that optimise safety, productivity, recovery, and sustainability outcomes to meet industry challenges. Since 2017, more than 250,000 WebGen™ wireless primers have been fired in over 6000 blasts worldwide. Most of these blasts were in underground mines, where the first generation WebGen™ 100 wireless blasting system quickly proved its value by reducing the exposure of workers to unstable ground and recovering ore that would have otherwise been left behind.

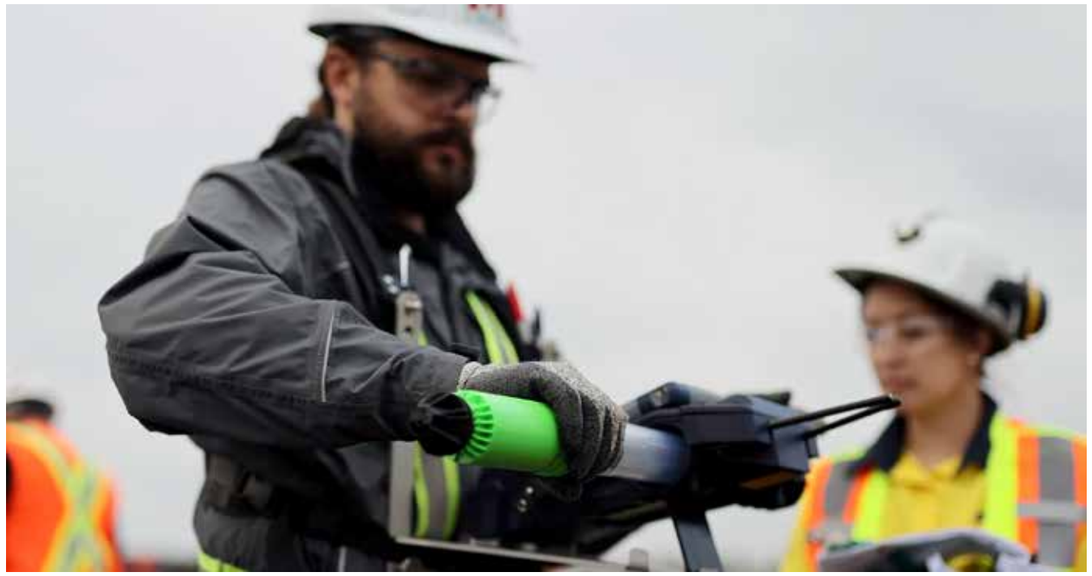
The latest generation of the product, WebGen™ 200 offers four variants, including one specifically designed for surface mining applications. In this article we explore the use cases for wireless blasting in surface mines to understand how open cut mine operators and owners can exploit this technology for safety and productivity benefits.

BLASTING WITHOUT WIRES

Before the advent of wireless blasting in 2017, blastholes were initiated with physical connections using electrical wires or signal tubes. These methods are labour-intensive and can be prone to missed connections and breakage, leading to potential misfires. In certain jurisdictions, the practice of sleeping tied blasts is prohibited, posing challenges for adjusting blasting schedules on short notice. Furthermore, sleeping blasts occupy considerable bench space, impeding the operational efficiency of load and haul fleets, particularly in deep mines and on narrow cutbacks. Orica's WebGen™ stands as the world's first fully commercialised wireless initiation system, eliminating all wires from the blast. WebGen™ uses a low frequency magnetic induction signal that penetrates hundreds of metres through rock, air, and water to initiate blastholes wirelessly. WebGen™ primers are assembled and encoded on the blast pattern and lowered into the blasthole. Once there, they can sleep for up to 90 days[1] and be ready to fire within minutes.

WIRELESS BRINGS PRODUCTIVITY AND SAFETY BENEFITS TO SURFACE MINES

Although the first five years of the WebGen™ story was all about underground customers, surface customers are now exploring ways to exploit wireless blasting. The primary advantages for open cut mines are enhancing worker safety and optimising fleet productivity. These benefits align with Orica's premise that when blastholes are stemmed and the primers are positioned a minimum of three meters from the collar, the risk of unintended initiation due to factors like lightning strikes or a vehicle inadvertently running over a



blasthole are significantly mitigated. Orica proposes that with appropriate quality control and demarcation, sleeping WebGen™ blasts can be converted into temporary haul roads. Orica refers to this concept as Mine Schedule Flexibility as it frees short term planners from many of the constraints imposed by conventionally primed sleeping blasts. It is proving most valuable in deep open pits and on narrow cutbacks but will have application in surface coal mines too.

Orica's Geoff Stevenson was responsible for much of the work that went into proving the Mine Schedule Flexibility concept. Geoff said "*running heavy mining equipment over loaded blastholes is anathema to anyone who works in mining. However, we did a very detailed analysis of the risks. Provided a site can maintain reliable demarcation and control over drills and excavators, there is no plausible risk to running a grader over the loaded blastholes and using that part of the bench as a haul road.*"

Armineh Hassanvand is an Orica Senior Research Engineer who ran a program of testing at a coal mine in NSW to validate the concept.

Armineh said "*We loaded test boreholes with ungassed emulsion, inert WebGen™ primers, and several pressure measurement devices. Some of these test holes had as little as 0.5 meters of stemming or no stemming at all, to simulate worst-case scenarios. We then drove over the test holes with loaded dump trucks, excavators, an Orica Mobile Manufacturing Unit, and various other mining equipment. The experiment was later repeated at a coal mine in Queensland with a dragline transversing over test holes. The tests demonstrated that even the largest and heaviest mining machines can safely traverse blastholes primed with WebGen™. Recorded increases in pressure were well below levels that could damage the primer or compromise the quality of the bulk explosives. Through desktop modelling, we have also found the risk of ignition from a heavy vehicle fire over a loaded hole to be negligible.*"

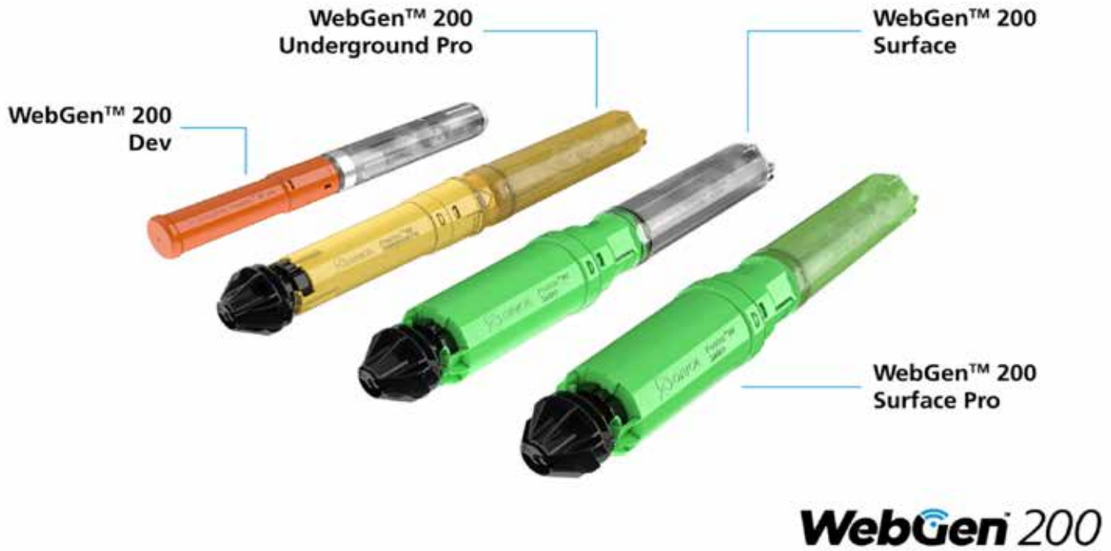
The use of wireless primers also reduces the number of blast crew visits to each hole and minimises the time spent at the collar of the hole. In contrast, traditional wired and non-electric downlines usually require a crew member to hold the downline while loading and stemming the hole. Geoff said "*Placing dry crushed aggregate stemming presents a serious respirable dust hazard to the worker holding the leads, and there are secondary risks of interaction with the stemming loader, as well as the risk of cutting the downline. Wireless primers eliminate or greatly reduce all these risks.*" WebGen™ also minimizes the duration blast crew workers need to spend within the rockfall zone under highwalls while priming, charging, and stemming holes.

Lightning risk reduction is another key value proposition of wireless blasting advocated by Orica. Mines situated in areas with frequent lightning strikes often face significant productivity losses due to the need for exclusion zones around sleeping blasts to mitigate the risk of unplanned detonation. Orica asserts that blastholes primed exclusively with WebGen™ primers are impervious to unplanned initiation by lightning strikes.

Armineh was also responsible for eliminating key risk factors associated with lightning. Armineh said *"for a sleeping bench, lightning poses unplanned initiation risk to conventional detonators that use electric wire, signal tube, or detonating cord. WebGen™ mitigates risk by eliminating this path. When a WebGen™ primer is deeper than 3 meters below the surface, even a direct lightning strike at the collar of the hole fails to generate the heat or pressure needed to initiate the primer or the bulk explosive."*

WIRELESS RELIABILITY AND SECURITY

In the absence of wires connecting blastholes, it is important for the Shotfirer to have confidence that sleeping WebGen™ primers will effectively respond to signals to arm and fire at the designated time. Given its wireless nature, it is essential for the Shotfirer to have



confidence that the primers will only respond to the intended signal. To meet these critical safety standards, WebGen™ incorporates technology to assess the signal's reliability within the blasthole where the wireless primer is to be placed.

WebGen™ blasts are initiated using a WebGen™ transmitter and inductive antenna with a self-contained power supply. The larger antenna is a 40m metre diameter loop, usually set up in a semi-permanent installation. There is also a semi-portable quad-loop antenna. The range of the signal primarily depends on the antenna and mineralisation, particularly the presence of ferromagnetic and sulphide minerals.

Before implementing WebGen™ at a mine site, Orica's WebGen™ Technicians conduct a thorough signal survey to assess the signal range from the intended antenna location. This survey is repeated before each blast to verify that conditions haven't changed between charging and firing. Additionally, the transmitter and antenna undergo four routine tests to guarantee the reception of transmissions by the sleeping primers.

WebGen™ is designed to the international Safety Integrity Level 3 (SIL-3) to ensure WebGen™ primers will only respond to valid WebGen™ transmissions. Orica's Vice President of Commercialisation, Nigel Pereira has been involved with WebGen™ since the start. He said, *"Orica sought the demanding SIL-3 rating for WebGen™ to demonstrate our confidence in the WebGen™ system, and we believe it sets a benchmark for wireless blasting in the industry."*

INTRODUCING THE WEBGEN™ SURFACE PRO PRIMER

One of the biggest challenges in bringing wireless blasting to the surface market was designing a primer capable of enduring the rigorous demands of large diameter, deep blastholes. Rhys Patterson is the Senior Global Product Manager of WebGen™ for Orica. Rhys said *"sleeping WebGen™ primers must withstand the hydrostatic pressure imposed by the explosive column and the dynamic pressure and acceleration created by adjacent blasts. While designers of electronic detonators have already recognised and addressed these problems, solving the issues for a user-assembled primer with more complex electronic components has not been easy. We believe our WebGen™ Surface Pro primer can meet the demands of large diameter surface customers, and sleep for up to 90 days, depending on blasthole temperature."*

Another challenge for early adopters of wireless technology is regulation. Orica has deployed WebGen™ on more than 75 sites across 6 continents and in 13 countries globally since 2017. Rhys said "in many places blasting regulations and site procedures are written specifically for conventional blasting methods using wires and signal tube. Orica is now experienced in bringing wireless blasting to such places for the first time. We believe we have a solid understanding of the unique risks and controls required to do wireless blasting safely, and that we can demonstrate how it reduces net risk."

THE WIRELESS FUTURE

The evolution of wireless technology in some ways mirrors the early stages of wired electronic systems introduced circa 2000. Initially embraced by underground mines, this innovation later found traction in surface mines as manufacturers tailored the product to align with industry needs. Rhys notes *"as with electronic detonators, we don't expect wireless blasting will completely replace conventional systems any time soon. However, there are many scenarios where going wireless clearly creates value on the surface and underground. We expect our customers*

will discover more clever ways to use WebGen™ as adoption grows."

Although the current version of WebGen™ is a one-way communication system, Orica plans to incorporate two-way communication in future generations. Nigel said *"all the latest wired electronic blasting systems on the market have offered two-way communication, so this is something customers have grown used to and expect from a wireless system. Orica is focussed on two-way communication as a future feature, and we are well on the way to solving that problem."*

Orica's next generation of digital technologies and solutions look to deliver solutions beyond blasting. Using data, analytics and modelling to connect end to end workflows across the mining chain allowing customers to optimise their entire operations. The integration of innovative products like WebGen™ and the 4D™ bulk emulsion delivery system with Orica's SHOTPlus™ software equips engineers with the necessary resources to design for improved blast performance and deliver downstream benefits.

Eventually, Orica expects wireless primers will enable fully mechanised blasthole charging and autonomous or remote operation of surface blasthole charging equipment. Nigel said *"WebGen™ is a key enabling technology for Orica's Avatel™ mechanised development charging system for underground. Similarly, we expect that wireless systems will help us bring autonomous charging for surface mining to reality."*

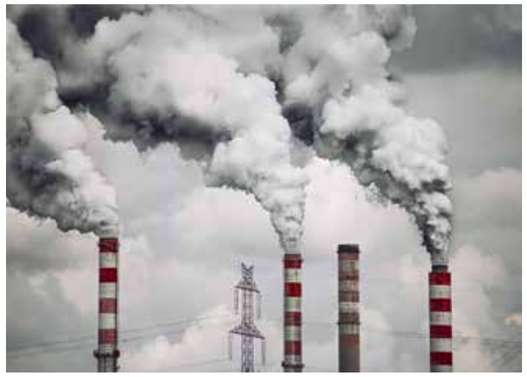
LATEST NEWS

Orica plans to demonstrate the WebGen™ 200 system at an open cut coal mine in the Hunter Valley, New South Wales in mid-2024. This will be the first use of WebGen™ at a coal mine in the region. The demonstration will use WebGen™ Surface Pro wireless primers in overburden blasts. The objectives of the demonstration include measuring the productivity benefits of wireless blasting for the blast crew, and showing mine operators and regulators how wireless blasting can reduce risk and improve productivity. Keiran Balkin, South Surface Coal Area Business Manager said, "We're interested to see how this maturing technology can be adapted to the unique conditions and requirements of large-scale overburden blasting and bring benefits to our customers and the mining industry."

NEWS, PLANT AND EQUIPMENT

Bulgaria sees surge in solar power and coal plant decline in 2023 electricity report

A remarkable shift in Bulgaria's energy landscape has been unveiled in the latest report from the Commission for Energy and Water Regulation, submitted to the Bulgarian parliament. The data reveals a staggering increase of over 140% in electricity production from photovoltaic plants, accompanied by a significant decline in output from coal-fired power plants in the year 2023.



According to the report, Bulgaria's total electricity production in 2023 amounted to 35,861,159 MWh. Notably, the nuclear power plant in Kozloduy claimed the lion's share at 43%, followed by thermal power plants contributing 29%. However, the most notable shift was witnessed in the realm of renewable energy sources, which accounted for 18% of the total electricity generated, with hydropower plants contributing half of this output.

The surge in solar energy was particularly pronounced, with photovoltaic plants witnessing an astounding growth of 140.92% compared to the previous year. The electricity generated from photovoltaics amounted to 1,558,739 MWh in 2023, signaling a doubling of installed capacity and marking a significant milestone in Bulgaria's renewable energy transition.

In contrast, wind power plants experienced a more modest growth of 5.23%, producing 809,580 MWh of electricity throughout the year.

However, amidst this renewable energy boom, traditional coal-fired power plants faced a sharp decline in output. Lignite coal plants saw a staggering drop of 45.56%, while brown coal plants fared even worse with a decline of 50.99%. This significant downturn underscores the shifting dynamics within Bulgaria's energy sector as the country seeks to reduce its reliance on fossil fuels and embrace cleaner alternatives.

The data from the Commission's report highlights a paradigm shift in Bulgaria's energy landscape, with renewables emerging as a key player in the nation's quest for sustainability and energy independence. As the country continues to chart its course towards a greener future, the challenges and opportunities presented by this transition are set to shape the trajectory of Bulgaria's energy sector in the years to come.