

# Blasting without wires in surface and underground



A WebGen™ unit is encoded at CMO Northparkes mine by an Orica engineer, ready for loading.

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ince the launch of WebGen™, the world's first wireless initiating system in early 2017, Orica has executed more than 500 blasts fired using the wireless technology in both surface and underground mines around the world.

WebGen™ is one of the most exciting blasting technologies to be developed since the introduction of electronic blasting systems in the early 2000's. This revolutionary system allows for groups of in-hole primers to be wirelessly initiated by a firing command that communicates through rock, air and water. This eliminates the need for down-wires and surface connecting wires, enabling new mining methods and blasting techniques that are safe and reliable – removing people from harm's way, reducing operating costs, and at the same time increasing productivity benefits. This step-change in blasting technology has the potential to fundamentally change the industry approach to blasting and mining.

Using low frequency magnetic signals to communicate with each WebGen™ primer prior to a blast, WebGen™ is the only commercial explosives product with a Safety Integrity Level (SIL) 3 rating – having the highest functional safety standard of any commercial explosives product in the world. The system includes a i-kon™ III plugin detonator, a Pentex™ W booster and a DRX™, which is a digital receiver comprising a multi-directional antenna and a battery which serves as the in-hole power source.

## ENABLING NEW MINING METHODS UNDERGROUND

WebGen™ has demonstrated its success in various underground mines and led to the development of several new mining techniques that would have otherwise been deemed impossible to execute without wireless blasting technology.

At Musselwhite mine, an underground mine owned and operated by Newmont, located on the southern shore of Lake Opapimiskan in Canada uses a Temporary Rib Pillar (TRP) method enabled by WebGen™ to extract ore pillars that previously could not be recovered in underground operations.

Using the WebGen™ enabled TRP method, the main ore of the panel were blasted and extracted while the TRP held back the waste rock backfill. For Newmont, this delivered a 34% reduction of waste dilution, increased truck fill factors, improved ore recovery and 20% improved mucking productivity.

Newmont Musselwhite Chief Engineer, Billy Grace, said: "Since starting the TRP trials with WebGen™ in late 2016, our level of comfort with the technology has reached a point that discussing possible wireless applications is an integral part of our mine planning process.

"The entire team is excited by the possibilities that WebGen™ opened up, and the new opportunities they are allowing for us to increase our productivity."

Based on the success of the TRP method, six additional WebGen™ enabled mining methods have been successfully developed and implemented, resulting in similar positive outcomes

At CMOC Northparkes, a copper and gold mine located near Parkes, New South Wales, Australia, the underground mine uses block caving methods in their operations. Due to the poor ground conditions at the site, pre-charging with a wired system was not a viable solution and would expose site personnel to undertaking remediation work.

CMOC Northparkes, Mining Operations Manager Robert Cunningham said: “We’ve done some work recently with Orica around WebGen 100 and we’ve seen a sensational result.”

The game-changing technology delivered 75% reduction of drill and blast crew exposure time at the brow and 96% reduction re-work and eliminated re-drills at the mine. This was made possible, using WebGen™ enabled sub level caves (SLC) mining methods. The introduction of WebGen™ delivered improvements in operator safety and mine productivity during pre-charging by eliminating the need to work near the brow.

With the introduction of WebGen™, Northparkes experienced 25% firing to schedule improvements and 37% increased drawpoint availability, significantly increasing safety and productivity at the mine.

## BREAKING NEW GROUNDS IN SURFACE MINING

While WebGen™ was initially deployed in underground applications, it is now increasingly being adopted in surface mining. To-date, Orica has completed successful surface blasts using WebGen™ across 3 continents. With its wireless capability, WebGen™ presents an opportunity to overcome one of the industry’s most persistent limitations – a physical connection to each primer in a blast.

Wired systems have a large physical presence and are susceptible to damage at every point along the connecting line. The potential for misfires due to downline damage has commonly led to the application of redundant initiation systems and can prevent loading of adjacent blast patterns due to flyrock damage. These contributing factors increase blasting costs, reduce mine efficiency and limit blast productivity. Wired systems in priming, loading, stemming and tie in activities require precautionary measures to protect wired connections, adding burden to manpower needs and timing.

Being fully wireless, the application of WebGen™ in surface mining simplifies bench operations with no tie-in process, and reduces on bench resources, inventory and misfires that occur due to line damage or cut-offs, slumping or operator error. Stemming costs are also reduced and back-up inventory is eliminated with wireless systems.

The absence of downlines also removes the interaction between heavy vehicles and initiating systems while reducing people exposure to on bench hazards. The tie-in process is eliminated, and spotters are not required to protect downlines nor exposed to dust and dangers from stemming operations.



WebGen™ uses low frequency magnetic induction signals to transmit firing commands.

With increased flexibility in pit planning and blasted inventory, mine operations enabled by WebGen™, can prime and load larger single blasts as well as eliminate firing window variability.

Additionally, due to the conductive characteristics of wires in surface mining, lightning storms pose one of the primary challenges in surface mining around the world. In the event of approaching lightning storms, a mining exclusion zone is place around the loaded blast or in some cases the blast is cut short and immediately fired. As WebGen™ does not require downlines and surface wires, lightning production costs and the risk of unplanned initiation of loaded blast holes is significantly reduced while production constraints from exclusion zones are completely removed.

## WORLD'S LARGEST WIRELESS BLAST WITH WEBGEN™

In November 2019, Orica introduced WebGen™ to the BHP Billiton Mitsui Coal (BMC) Poitrel mine as part of a staged approach to assess the viability of wireless blasting in a surface mine operation.

A metallurgical coal mine located in northeast Australia, BMC Poitrel committed to four wireless blasts which



Wireless blasting with WebGen™ significantly reduces the risk of lightning initiation in a blast hole.

included the world's largest wireless blast that included 1,920 wireless primers in a Stratablast™ method, comprising of the top horizon as cast and lower horizon as coal protection, ensuring maximum coal recovery for BMC.

The blast demonstrated the performance and capabilities of WebGen™ in a production capacity and served as a development process to introduce WebGen™ wireless blasting into the blast operations at BMC Poitrel.

BMC Poitrel Mine Production Manager, Jayson Smeeton said there were significant safety and efficiency improvements to be made by using the WebGen technology Orica is trialling.

"Wireless blasting means we are able to really reduce our people's exposure to dust in the pit, and it eliminates the potential for misfires because they do not need to physically tie each hole in to the blast pattern," Jayson said.

"Eliminating the need to tie in each hole also makes the process for loading explosives far more efficient, and less susceptible to wet weather delays, as the pit does not need to be shut down because of the potential risk of accidental ignition during thunderstorms."

Focused primarily on efficiency benefits, the WebGen™ evaluation blasts at BMC Poitrel delivered a significant reduction in exposure time to on bench hazards.

BMC Poitrel spends significant time in tie in and detonator logging activities. When schedule revisions turn up,



The world's largest wireless blast at BMC Poitrel coal mine.

production delays may occur and requires the blasting crew to leave behind one blast to prepare another. The wireless capability of WebGen™ reduced such delays as loaded blasts would be ready to fire at the completion of stemming, without delay for tie in.

The mine realised considerable time savings through the elimination of several activities that would not have been possible with a conventional electronic blasting system. Activities eliminated included downline protection and inspection, laying out prime safes, and concurrent activities

such as logging the detonators and delivering boosters and detonators to the hole as part of the assembly and encoding process. The efficiency analysis showed considerable improvement in tonnes and holes per man hour.

### WEBGEN™ 200 – HARNESSING DIGITAL TECHNOLOGY FOR THE FUTURE

A new generation of wireless initiation system is set to take the stage in the last quarter of 2020. WebGen™ 200, a newer, improved version, harnesses digital technology to allow advanced reprogramming and digital inventory management, offering mine operations an integrated user interface for quality assurance and quality checks.

With encoding capabilities and security enhanced, the reliability of each blast is further improved with the new generation WebGen™ 200 detonators designed to endure even greater shock resistance.

Orica continues to break new grounds and territories with their WebGen™ fully wireless blasting system, enabling new ways of mining, new thinking and supporting the industries drive towards safer and more efficient mines of the future.