Full-Fleet Electrification

Ground Support | Ore Flow | Utility Vehicles

OUR COMMITMENT TO MINING SAFETY AND PRODUCTIVITY RUNS DEEP.

CANADA | MEXICO | PERU | SOUTH AFRICA | AUSTRALIA

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MacLean

Performance. Reliability. Innovation.

EVseries

ELECTRIC VEHICLE

The MacLean approach to battery propulsion is built on giving our customers access to best-in-class battery, electric motor, onboard charging, and vehicle analytics technology, and then successfully integrating these components into mobile underground equipment by leveraging our multi-discipline engineering expertise, hard rock mining knowledge, and custom manufacturing experience. In other words, you can't just understand the battery cycle, you need to understand the mining cycle in which it will be used.

This is how MacLean has developed battery power, engineered for life underground.

Why battery power in underground mining, and why now?

Battery power in mining isn't new. What is new is the advancement of battery and electric drivetrain technologies and their commercial availability, together with MacLean's engineered integration of these components onto ground support and production support rigs designed and built to withstand the rigours of the underground environment.

Did you know:

The amount of ventilation that diesel-powered mobile equipment requires in the underground mining environment, to ensure workers' health and safety, can typically represent some 50% of mines' overall energy costs (and this cost pressure is amplified as mines look to go deeper and chase ore bodies in an economic fashion).

In underground mines in Ontario, fatalities from occupation-related respiratory diseases were significantly higher than fatalities from workplace accidents over the past decade (Source: WSIB, EIW Claim Cost Analysis Snapshot, as of March 31, 2015).

Business Case for EV Propulsion:

Worker Health and Safety:

- Elimination of diesel particulate matter (DPM) and all other emissions associated with diesel engines
- Elimination of noise, vibration and heat associated with diesel engines
- Elimination of potential ignition source generally associated with diesel exhaust systems and wrapping or shielding

Cost savings:

- Overall reduction of ventilation required to match diesel horse power ratings underground
- Reduction in diesel engine maintenance and spare parts stocking expenses
- Elimination of diesel fuel costs including purchase, transportation, storage, and distribution of fuel

Operational:

- Potential to reduce site GHG footprint
- Performance not impacted by altitude (battery propulsion does not require de-rating)
- Regenerative braking offers better down-ramp speed control and energy recovery

The MacLean EV Series supports the industry transition to diesel-free mine planning, as a means of realizing operating cost reductions and underground air quality improvements.

Since 1973, MacLean Engineering has been designing mobile equipment that increases productivity, reduces costs and enhances operator safety in hard rock mining.

In 2015, we turned our product development attention towards designing a battery powered fleet that would respond to the mining industry's growing need for cost containment through energy and mine design efficiencies, along with improving underground air quality for miners. The MacLean EV Series, unveiled in 2016, delivers diesel-free propulsion by incorporating leading edge battery and electric drive technology, along with sophisticated battery management and monitoring safeguards, to ensure a high-performing, safe, and data-rich EV fleet solution.

EVseries

ELECTRIC VEHICLE

MacLean Fleet Electrification milestones:

In 2016 we built and trialed three EV units, and that same year we manufactured an EV fleet (bolters and utility vehicles) for Goldcorp's Borden project in Chapleau, Ontario, which is expected to be the world's first all-electric mine by the time it reaches production stage. Our R&D efforts going forward will focus on rolling out EV propulsion packages across the full range of our product lines, in both standard (8 foot / 2.4 metre) and smaller section (6 foot / 1.8 metre) carrier configurations.

MacLean EV Series

		COMMERCIAL AVAILABILITY
GROUND SUPPORT	Platform Bolter	2016
	Cable Bolter	2017
	Small Section Bolter	2017
	Shotcrete Sprayer	2017
	Shotcrete Transport	2017
ORE FLOW	Water Cannon	2018
	Blockholer/Secondary Breaker	2018
	Mobile Rockbreaker	2018
UTILITY VEHICLES	Scissor Lift	2016
	Boom Truck	2016
	Cassette Trucks	2016
	Boom Lift	2017
	Personnel Carrier	2017
	Explosives Chargers	2017
	Material Transporters	2017
	Water Sprayers	2017

MACLEAN
360
PROMISE

To learn about the **MacLean 360 Promise** Customer Support Program, visit macleanengineering.com

info@macleanengineering.com

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