



EVseries

 ELECTRIC VEHICLE



MacLean EV Series™

Full-Fleet Electrification | EV-proven, EV-ready

OUR COMMITMENT TO MINING SAFETY AND PRODUCTIVITY RUNS DEEP.

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 **MacLean**

Performance. Reliability. Innovation.



 **EVseries**
ELECTRIC VEHICLE

MacLean BEV network effect



The 2016 introduction of the MacLean EV Series™ of zero emissions/DPM, low maintenance, low heat, low noise, data-rich, high performance mining vehicles was a product development milestone for the company. Since then, we have gone on to manufacture and commission over 40 battery electric mining vehicles (BEVs) at underground mines globally, with over 100,000+ operating hours to date.

MacLean is building on this BEV 'network effect' as the push for diesel-free underground mobile fleets continues to gain momentum around the globe. This BEV shift in the industry is driven by mines' need to increase safety and productivity while also bringing down production costs.

Be it lower maintenance and ventilation requirements, worker productivity improvements in a diesel-free underground environment, or the support to reputation from a sustainability-focused mine design and fleet procurement strategy, there are multiple benefits from turning on the mine electrification switch.



EV drive design

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. We integrated these components into mobile underground equipment by leveraging our multi-discipline engineering expertise, hard rock mining knowledge, and custom manufacturing experience.

We also added battery sizing optionality, through Xalt battery technology, which provides customers with more flexibility to fit their specific BEV units with the specific underground mine design and application, i.e. the job that needs to get done.

EV Benefits:



Reduced Heat & Noise Generation



Elimination of Diesel Particulate Matter



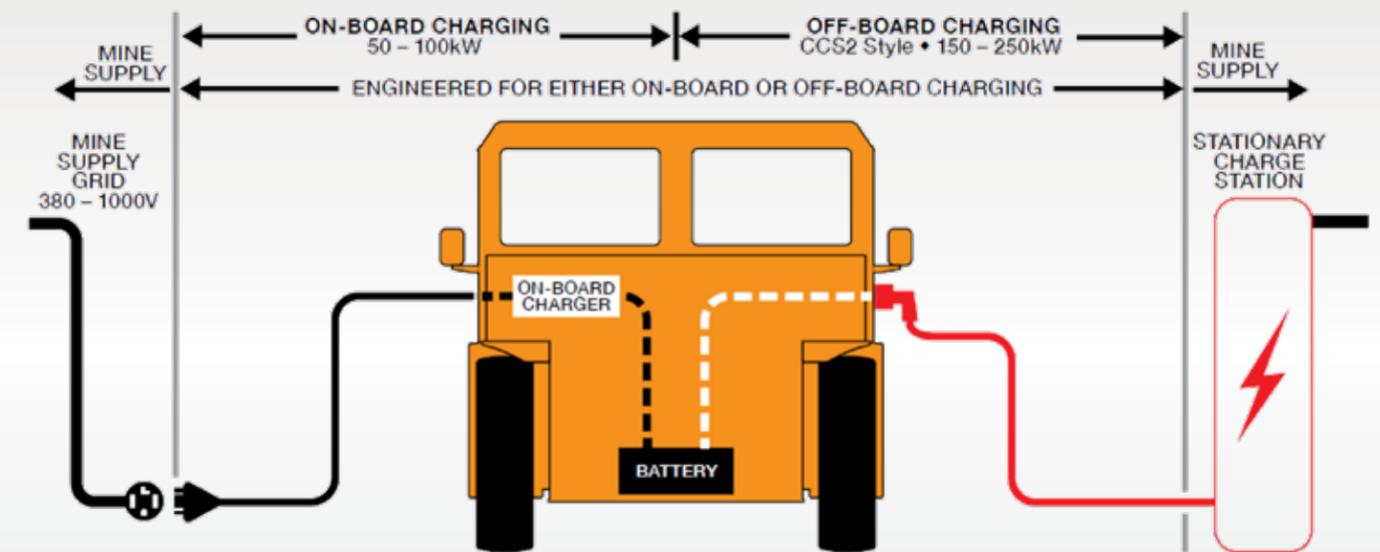
Reduced Planned Maintenance Requirements



Reduced Ventilation Requirements

New Charging Options On Board/Off Board or both

- With this option, equipment batteries can be charged with the onboard chargers through a jumbo cable, or with off-board chargers through a CCS2 connector.
- The charge rate depends on the capacity of the charger and the battery's capability to accept the charge. MacLean equipment can receive charges between 100-250kW.
- This option is particularly attractive if there is already a need for CCS2 chargers for other equipment on the project, and for the MacLean grader.



EV mine planning support services

As an experienced underground mining equipment manufacturer, we also offer in-house mining application and mine design expertise. Duty cycle modelling and analysis can be performed for all models across the MacLean BEV fleet, to estimate vehicle performance and provide charger/battery combination recommendations.

What's required:

- Grades and distances
- Type of machine
- Short description of their intended use cases

Let MacLean support you in your EV switch. We are happy to provide static duty cycle simulations for your applications to find out which BEV fleet and battery sizing configuration will work for your specific ore body, mine design, and mining cycle.



Real-time monitoring

MacLean's years of underground experience in servicing and supporting BEV fleets across Canada has helped us maximize the benefits of the MacLean EV Series telemetry system.

Our proprietary vehicle monitoring technology provides operators with screen-based, real-time data in the BEV units' cabs. It allows MacLean technicians and engineers to remotely tie-in through a cloud-based dashboard where real-time performance and battery health data can be accessed, remote troubleshooting conducted and, if necessary, expert BEV technical support dispatched to site in a timely manner. With an extra set of eyes on your assets, you can be sure that we've got your back.



MacLean advanced vehicle technology development

The acquisition of an underground testing and training facility in 2018 (MacLean's Ducky Test Mine Research and Training Facility), has accelerated our innovation efforts.

Now close to a quarter of our engineering department resources are working within the Advanced Vehicle Technology (AVT) team. The AVT team is dedicated to developing technology enabled electrification and automation mining vehicle solutions, working out of our test mine in Sudbury, Ontario, Canada.

SERVICE. SUPPORT.

The MacLean Way. 

WHEN YOU BUY A MACLEAN MINING VEHICLE, YOU ARE FAMILY.

We care that our products and technologies enhance life above ground and below. Whether it's increased safety and productivity, or quieter, more ergonomic, zero emissions operations - our products make a real difference in the world. We back this up with a global branch infrastructure and technical support, field mechanics, and trainers. The result: increased machine productivity and operator safety and a lower Total Cost of Machine Ownership (TCO) for you.

To learn more, reach us at: info@macleanengineering.com



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