



# EVseries

 ELECTRIC VEHICLE



## MacLean EV Series™

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

OUR COMMITMENT TO MINING SAFETY AND PRODUCTIVITY RUNS DEEP.

CANADA | USA | MEXICO | PERU | SOUTH AFRICA | AUSTRALIA

[macleanengineering.com](http://macleanengineering.com)

 **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 30 battery electric mining vehicles (BEVs) at underground mines across Canada with over 50,000+ 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.





# Onboard charging design philosophy

Onboard charging has been integrated across the MacLean product suite of BEV units in the charging, ground support, secondary reduction, and production support product categories.

The onboard charging design philosophy behind the MacLean EV Series has been proven out in the years since the launch of the product line, as it eliminates barriers to introduction (no additional charging infrastructure required) and provides the highest degree of flexibility for non-production duty cycle requirements in underground mining.

# 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. In other words, it is not enough to 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.**

## EV Benefits:



Reduced Heat & Noise Generation



Elimination of Diesel Fine Particulate Matter



Reduced Planned Maintenance Requirements



Reduced Ventilation Requirements



# Product development roadmap

The next chapter in MacLean’s electrification and automation product development is currently being written with the 2020 release of battery electric versions of a next generation of MacLean shotcrete sprayer and mobile concrete transport truck.

## MacLean EV Series roadmap

### AVAILABILITY

#### CURRENTLY

975 Omnia Bolter  
BH3 – Blockholer  
AC3 – Anfo loader  
EC3 – Emulsion loader  
SL3 – Scissor lift  
DT3 – Deck truck  
BT3 – Boom truck  
FL3 – Fuel/lube truck  
FT3 – Fuel tanker

CS3 – Cassette carrier  
PC3 – Personnel carrier  
WS3 – Water sprayer

#### Q4 2020

SS5 – Shotcrete sprayer  
TM3 – Transmixer  
AG3 – Agitator truck

#### IN 2021

SSB – Small section bolter  
CB3 – Cable bolter  
WC3 – Water Cannon  
RB3 – Mobile Rockbreaker  
LR3 – Boom Lift  
2 Series carrier (6’ wide)  
GDR – 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

## How do you know what battery you need?

## What size charger makes sense?

In 2021, we will be offering customers additional battery options to provide both lower and higher storage and output capacities. We already provide a highly flexible onboard charging solution in 25kW increments and are looking to even offer the option of off-board charging. Mining electrification is not a “one size fits all”. Every operation and project is unique and so should the planning of every fleet.

**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 in Ontario and Manitoba 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.





# 360 – a number you can rely on.

**WHEN WE SAY WE'VE GOT YOUR BACK, WE MEAN IT. OUR MACLEAN 360 PROMISE ENSURES YOU ARE SUPPORTED WHEN AND WHERE YOU NEED IT.**

MacLean invests heavily in a global infrastructure of customer and technical support, field mechanics, operator and maintenance trainers, virtual reality training, product managers and engineering staff. The result: increased machine productivity and operator safety and a lower Total Cost of Machine Ownership (TCO) for you.



Visit [macleanengineering.com](http://macleanengineering.com)  
[info@macleanengineering.com](mailto:info@macleanengineering.com)

**STANDING BEHIND EVERY PRODUCT WE SELL, FOR LIFE.**

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