



ARTISAN VEHICLES

TRANSITIONING TO ZERO-EMISSION EQUIPMENT

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Chief Technology Officer



Current Status of the Zero Emission Mine

- Very Active in Northern Ontario
- New generation lithium battery equipment in service since 2011
- All major mining companies in Canada are planning a full conversion to zero emission equipment underground





KLG-Macassa BEV Fleet

Loaders:

- 11x 3yd from RDH
- 1x Artisan 1.5 yd EJC 60 conversion
- 4x Artisan A4 - 4 tonne
- 5x Epiroc ST7 - 7 tonne
- 4x Epiroc ST2G - 2 yd

Trucks:

- 6x Epiroc MT2010 (20 tonne)
- 3x Artisan Z40 (40 tonne)

34 machines, 38 chargers, 80+ batteries

187k combined operating hours (~118k LHD, ~70k Truck)

~80% of production from BEV

85% truck availability, 80-90% availability for LHDs

100% Artisan batteries and drive systems





Why use battery powered equipment?

- **Ventilation Reduction**
 - no emissions (H₂O/DPM/NO_x/etc.)
 - 89% reduction in heat
 - less dust (no tailpipe)
- **Cooling/Heating reduction**
 - less airflow = less cooling or heating
- **Time to Production**
 - expand with no new shafts
- **Productivity**
 - higher power and smaller
- **Health Concerns**
 - DPM/Dust/Noise/Vibration
- **Forthcoming Regulations**





Managing the Transition

Infrastructure

- Electrical Requirements
- Underground Shop Requirements

Charging Logistics

- Fast Charge or Swap

Personnel

- Operators
- Technicians
- Supply Chain
- Mine Management
- New service personnel type -
Battery equipment technician





Infrastructure Transformation





Infrastructure Transformation

Facilities - Swapping Bay

- Purpose built cut out
- Swapping Bay requires:
 - Higher back height
 - Level floor
 - Overhead crane
 - Room for machine
 - Room for 2-3 packs
 - Room for charger





Artisan Products



- Battery -Electric
- 4 tonne LHD

[ArtisanVehicles.com/A4](https://www.ArtisanVehicles.com/A4)



MUCKING VIDEO



Artisan Products



- Battery -Electric
- 40 tonne Truck

ArtisanVehicles.com/Z40





Artisan Products



- Battery -Electric
- 40 tonne Truck

[ArtisanVehicles.com/Z40](https://www.ArtisanVehicles.com/Z40)





Artisan Products



- Battery -Electric
- 10 tonne LHD

[ArtisanVehicles.com/A10](https://www.ArtisanVehicles.com/A10)

