# **ELECTRIC SHUTTLEWAGON**

**FAST CHARGE** 

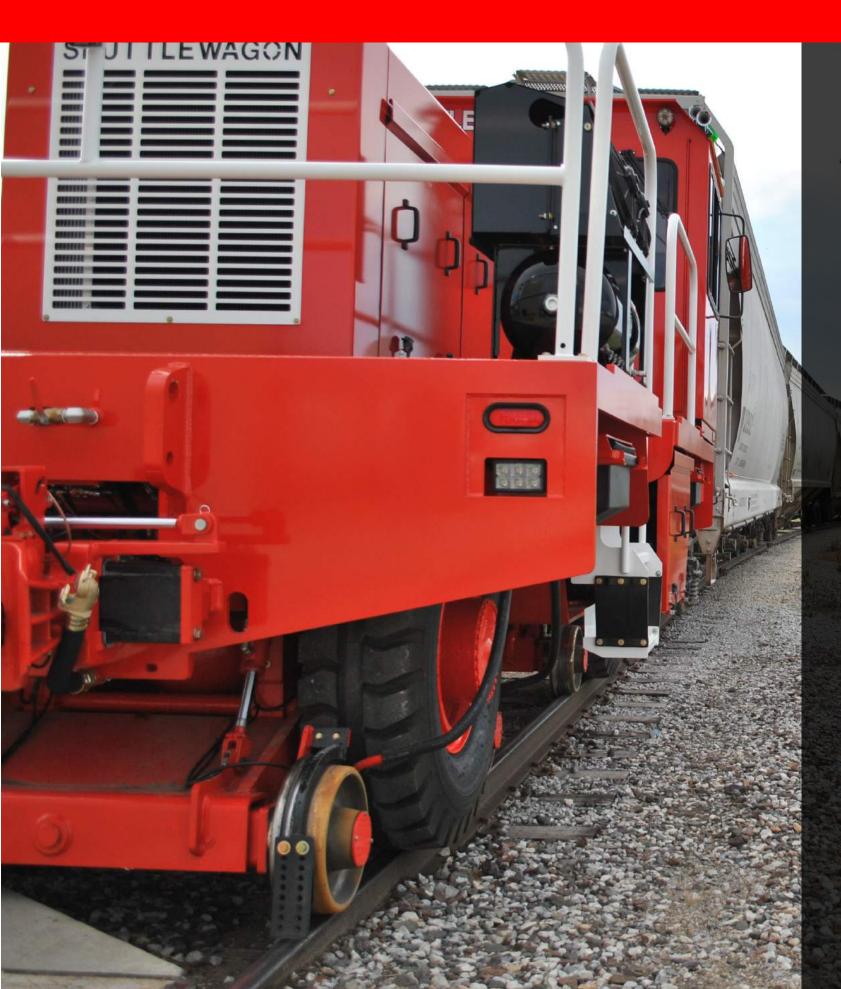
ZERO EMISSIONS

REGENERATIVE BRAKING

PRECISION DRIVE TECHNOLGY







### STANDARD FEATURES

- Zero Emissions
- Continuous Power Electric Motor
- Regenerative Braking
- Precision Drive Technology
- Lithium Ion Batteries
- Battery Management System
- SAE J1772 Connector
- Level 1, 2, & 3 Charging Capability
- External Recharge Strobe Light Indicator
- CAN-Bus Electric System
- Radiator 12 VDC fans provide air flow for cooling; transmission, traction motors, electrical components and batteries
- 66cfm Air Compressor
- Separate High Voltage Disconnect Boxes
- ABS Vehicle Brakes
- Air Knife
- Anti-Slip Traction Control
- Speed-Based Rail Guidance Pressure
- Lockable EV Electronic Door
- Two Air Ride Operator Seats
- 180 degree Rotating Operator Console
- (4) Video Cameras with Monitor Inside Cab
- (2) 12 Volt DC Power Ports
- (2) USB Charge Ports
- (1) 120 Volt AC 15 Amp Outlet



### **MACHINE SPECIFICATION**



**Width:** 120" (13,048mm)

**Length:** 296" (7,518mm)

**Wheelbase:** 168" (4,267mm)

**Weight:** 66,000lbs (29,484kg)

### **TRACTIVE EFFORT**

- 45,000lbs Single coupled, without weight-transfer
- Forward and reverse both road and rail

### **DETAILS**

• Electric Motor:

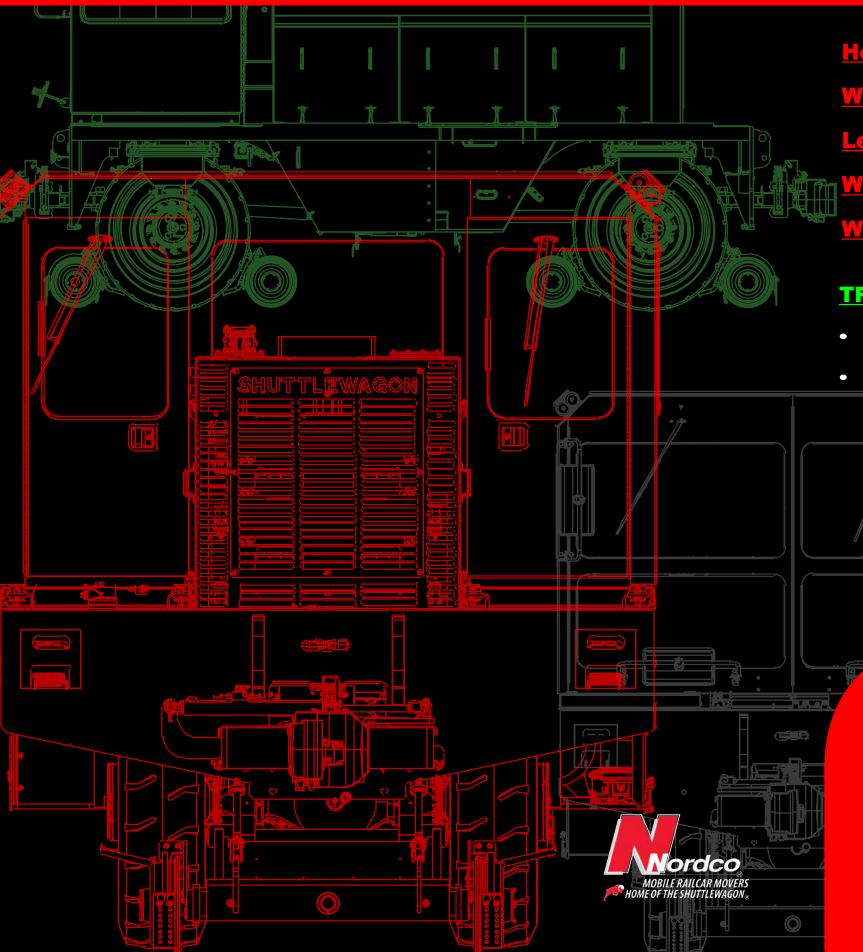
Continuous power 155kW

**Intermittent power 230kW** 

**Continuous torque 1400Nm** 

Max torque 2700Nm

- Lithium Ion Batteries with Battery Management System
   108 or 162kW Package
- IP65 rated compatible components





### **KEY DRIVE COMPONENTS**

### **Electric Motor and Inverter/Controller:**



**Traction Motor** 



Inverter



Automotive grade



Readily available & dependable



# Charging time: 3 h 29 m 0.0 MPH Gear: 0

# BATTERY PACK & BATTERY MANAGEMENT SYSTEM

- Batteries- Lithium Ion:

   400 VDC, 108kWh-standard offering
   Optional 162kWh
   8-10 year life span
   End of life capacity = 145kWh
   \*Life span based on # of charge & discharge cycles
- Battery Management System (BMS):
   Integrated cell monitoring includes:
   Amps, Voltage, Temperature
   Balancing and over current protection
   Maximize battery and cell life



IP65 rated compatible components



Built and certified for the automotive industry



Over 1 million cells in operation since 2004



Driven over 20 million miles since 2004

### **LEVEL 1 CHARGING**

- Charge provided through 120 volt (V) alternanting-current (AC) plug
- Requires dedicated circuit
- Level 1 charging is comparable to a standard household outlet
- Does not require special installation of charging equipment
- Utilizes standard 3-prong household plug with a special connector to vehicle
- 120V, 20A service with 15A of charging power
- Charges at 1.8kWh
- Takes 60 hours for 4 batteries for full charge
- Takes 90 hours for 6 batteries for full charge

### **LEVEL 3 CHARGING**

- Equipped with CHAdeMO technology (DC fast charging)
- Charge provided through 480 volt (V) direct-current (DC) plug
- Requires installation of charging equipment
- 480V, with 50-100kWh of charging power
- 50kWh charges 4 batteries in 2.2 hours
- 50kWh charges 6 batteries in 3.2 hours
- 100kWh charges 4 batteries in 1.1 hours
- 100kWh charges 6 batteries in 1.6 hours

Level 3 charging typically provides an 80% charge in 30 minutes

(Cold temperature may lengthen time)

### **LEVEL 2 CHARGING**

- Charge provided through 240 volt (V) AC plug
- Requires installation of charging equipment
- Installation requires dedicated 40 amp circuit
- Level 2 charging is compatible with all electric vehicles & plug-in hybrid vehicles
- Charging equipment has a cord that plugs directly into the vehicle in same location used for level 1 equipment
- 208-240V, 30-100A service with 20-80A of charging power
- Charges between 4.1kWh-15kWh
- Takes 7.2 hours for 4 batteries for full charge





Level 2 chargers: (Left) 15-30 AMP (Right) 80 AMP





# SHUTTLEWAGON DUTY CYCLE (10 HOUR SHIFT)

**ENGINE EFFICIENCY** 

ELECTRIC MOTOR EFFICIENCY



92%

1.8 GAL/HR

15.69 kWh

(equals 73.26kWh)

**18 GAL** 

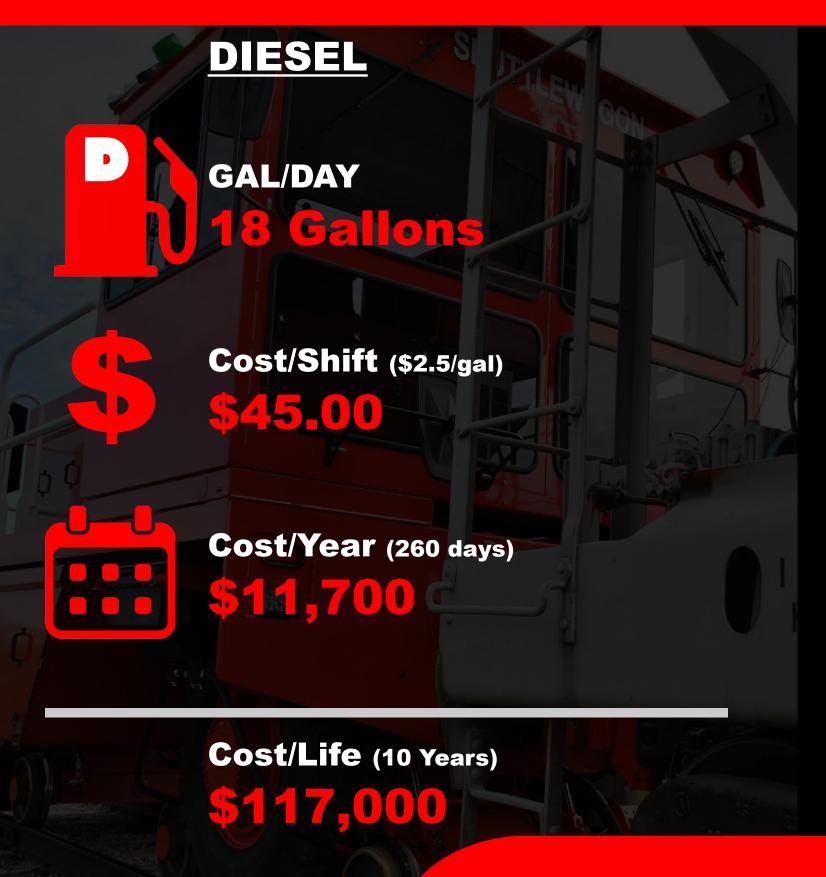
156.9 kWh

(732.6 kWh)



Values have been validated during testing at multiple locations.

### **OPERATIONAL COST** (10 HOUR SHIFT)



## **ELECTRIC**



kWh/DAY 156.9 kWh



Cost/Shift (.08/kWh)

\$10.05



Cost Savings: \$34.95/Shift

Cost/Year (260 days)

\$3,263

Cost Savings: \$8,437/Year

Cost/Life (10 Years)

\$32,630



Cost Savings: \$84,370/Life



### **MAINTENANCE COST**

• 10 year machine life (2,000 hrs per year baseline)

### **DIESEL= \$66,000**

(Engine oil, filter, fuel filter, transmission fluid, filter, etc.)

# ELECTRIC= \$17,200 (Coolant, axle oil)

# 74% savings over life of machine



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