ACS Railroad Solutions
Our Innovation Keeps Your Trains Rolling

ACS Railroad Solutions
Products and Services for Today's Railroading Environment

What We Do

Products

Railyard Devices
Innovative products that your maintenance crew can leverage to perform their jobs more efficiently and ensure you get Power when and where you need it

Locomotive Enhancements
Add-ons to your existing fleet to automate and modernize locomotive operation and maximize the value of your PTC systems

Connectivity
A range of cables, antennas, converters and specialty products that facilitate both in-cab and remote data acquisition

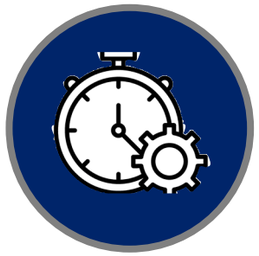
Idle Reduction
Lithium Ion Battery Technology, working in conjunction with an AESS, reduces fuel usage and GHG emissions by maximizing time between Locomotive restarts

Services

Professional Services
- Process development and documentation
- Technical Training
- FRA and/or Internal Audits
- Project Management

Mechanical Labor
- Retrofit locomotives with new technology
- Systems Integration
- Troubleshooting

What We Do For You!



Operational Efficiency
Get your locomotives repaired quickly and back on the road

Sustainability
Reduce your Greenhouse gas emissions and lower fuel costs

Enhanced Safety & Employee Wellbeing
For both Train Crews and Repair Shop associates

Regulatory Compliance
Products & Services to ensure compliance with FRA and/or internal requirements

A Day in the Life of a Yard Locomotive

In Use

Moving cars around and positioning them to form a train

Typically 7 hours a day

Presented data represents estimates based on data obtained from locomotive on-board systems and railroad associate input
Your experience may vary

Parked

When not in use, locomotives cannot be turned off for extended time periods:

- Risk of not being able to restart due to battery discharge
- A variety of on-board systems may need to remain operational

A yard locomotive could idle for 17 hours a day, equating to:

- 87 gallons of additional fuel use
- 2000+ pounds of additional GHG emissions

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Employing an Automated Engine Start/Stop System is a typical way to reduce idle time But there are significant drawbacks

AESS systems produce a binary result - all primary systems either on or off

HVAC Systems

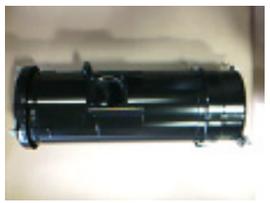
- The efficacy of an AESS system is often nullified by weather conditions
- Train Crews often override the AESS and idle the locomotive in order to maintain a comfortable temperature

Safety & Analytic Systems

- Capture of in-cab and external video may be compromised
- Predictive maintenance and other locomotive analytic data may not be captured

Additional engine starts create wear and tear that can drive up maintenance costs

Electric Starter replacement cycles may increase from 2 years to 1 year



Oil/Oil Filter and Fuel Filter replacements cycles many increase from 6 months to 3 months

Mechanical Labor may increase by 200+ hours per year

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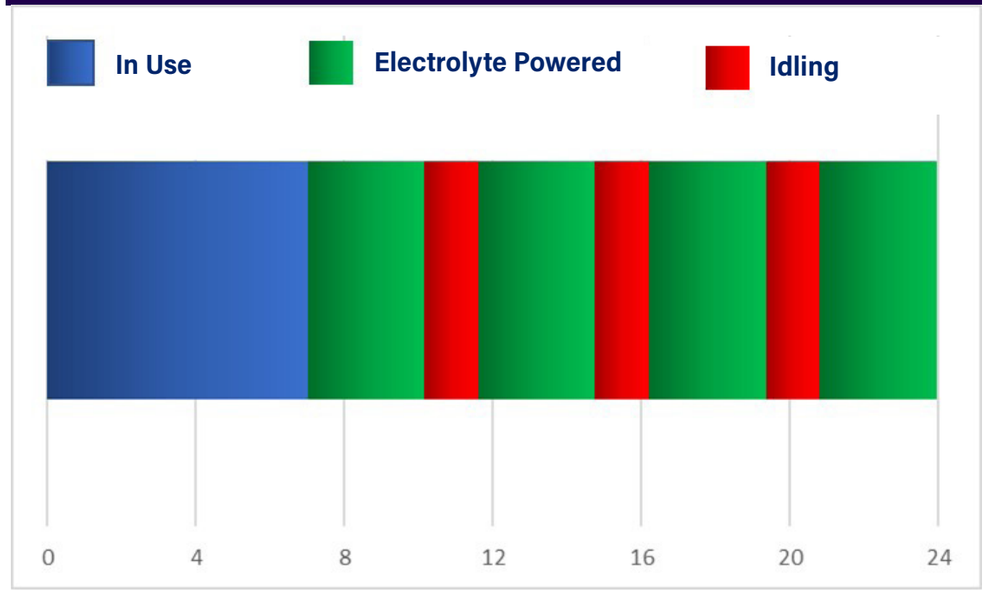
The ACS-RS Electrolyte Power System Can Reduce Idle Time by 74%

Time in state over 24 hour period



- Using Lithium Ion Battery technology, the ACS-RS Electrolyte Power System can power locomotive system loads for up to 3.15 hours continuously
- The system can be fully recharged by having the locomotive under power for 1.45 hours
- Idle time is reduced from 17 hours to 4.35 hours

- This example represents the most conservative scenario
  - HVAC system and other parasitic loads fully powered (83% reduction possible if HVAC system is not operated)
  - Assumes In Use time is contiguous - non contiguous use would enable the ACS-RS Electrolyte Power system to recharge while is use, instead of while idling

- Additional maintenance related costs savings via fewer engine starts

Potential Idle Hrs. Year

4538 Hrs

- Locomotive in use 7 hours/day
- Available in Yard 270 days

Idle Hrs. Post Implementation

1164 Hrs

- 74% reduction in Idle Time

Fuel Savings

$55,050

- 5.1 gallons used per idle hour
- $3.20/gal price for diesel fuel

Maintenance Savings

$5,197

- Electric Starters
- Oil/Oil Filters, gas filters

Total Yearly Savings

$60,247

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Also Provides A Variety of Non-Financial Benefits

Reduced Green House Gas Emissions

- Proportional decrease in both running and cold start emissions (approx 2000 lbs./day)
- Reduction in:
  - NOX
  - CO
  - CO2
  - SO2
  - CH4
  - O3
- Reduction in other EPA regulated pollutants:
  - Unburned diesel Fuel
  - Engine Oil Slip into Exhaust

More Reliable Engine Starts

- ACS-RS Electrolyte Power System trickle charges the lead acid batteries while in operation so they are ready to go when the locomotive needs to restart
- For optimum results, pair with the ACS-RS Battery cranking monitor to provide an in-cab display of battery voltage levels

Enhanced Crew Comfort & Safety/ Improved Community Relations

- Crews can operate in a temperature controlled environment
- Walkways, step and cab fully lighted to enhance safety
- CIC and TIR systems continue to operate
- Reduced noise and odoriferous emissions for the surrounding communities

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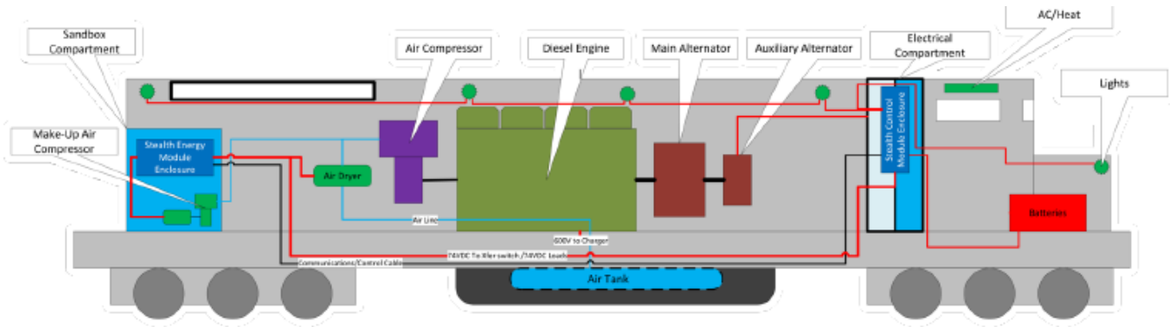
Applying the ACS-RS Electrolyte Power System can maximize the impact of your current AESS

Extend the time between restarts

- Electrolyte Power system powers auxiliary air compressors, minimizing restarts due to drop in main reservoir air pressure
- Topping off the Lead Acid battery reduces the possibility of parasitic load drain that may necessitate an engine restart
- Lithium Ion battery continue to power locomotive auxiliary loads, including the HVAC system - removing the key motivation to over-ride the AESS.

System Installation



- Electrolyte Power System Lithium-Ion Battery mounts in the Sandbox at the rear or the locomotive
- Electrolyte Power System Control Module mounts in the cab's electrical compartment
- ACS-RS can create an interface to your installed AESS and connect it during installation - ensuring the two systems work in concert.

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Based on Technology Proven In Other Harsh Duty Applications

Idle Mitigation

Ambulances

Tug Boats

Earth Moving Equipment

Remote Power

Irrigation Equipment

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ACS-RS Electrolyte Power System Specifications

Capacity:	49.8 kWH @ 72.9 nominal voltage
Weight:	945 lbs
Recharge Time:	1.45 hours (approximately)
Cycles:	4 cycles/day (w/locomotive in use 7 hours)
Partial Load Run Time:	6.3 hours @ 7400 Watts
Full Load Run Time:	3.15 hours @ 14,800 Watts

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