Locomotive Idle Reduction Options

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LOCOMOTIVE IDLE MINIMIZATION

Idle Technologies
• Automatic Engine Stop/Start (AESS)
  • Fuel Operated Heaters (FOH)
• Auxiliary Power Units (APUs)
• Shore Power Plug-In Jacket Water Heaters (JWH)

“Genset” Locomotives (and Other)

Goals and Impacts Include
• Fuel Savings +
• Emission Savings +
• Reduced Noise +

• Maintenance Cost (+ or -)
  • Reduced main engine hrs +
  • Idle unit maintenance -
  • Locomotive starters -
LOCOMOTIVE ESSENTIAL NEEDS

Monitored parameters:

• Air pressure (Brake Engagement)
  • Air loss on train cars triggers inspection, safety first
  • Locomotives do have manual brakes, but not train cars
• Battery voltage (engine restart, cab signal, etc.), maintenance important
• Engine coolant (its just water and corrosion inhibitor not glycol) minimum temperature (prevent cooling system dump @ 40 F)

Unique to Passenger Rail:

• HVAC - Commuter Rail Passenger Cars, normally HEP derived power
AUTOMATIC ENGINE STOP/START (AESS)

Advantages:

• Easy to integrate, can be used alone or in combination with other idle measures
• Small space required
• Monitors time (30 min), air pressure, battery volts and temperature(s)
• Effective above 35 F

Disadvantages:

• Can be overridden by operator when idle is “necessary”
• Will not reduce idle if ambient temperature is below 25 F
• Potential damage risk to main engine due to unattended starts
• Additional wear on main engine starters (EMD only)
GE TRANSPORTATION’S AESS

Automatic Shut-Down Considered After:
• 10-30 minutes idling and
• Ambient temperatures > 35 F and
• Adequate brake cylinder pressure maintained

Automatic Start-up Triggered By:
• Operator reverser handle command or
• Brake cylinder < minimum pressure or
• Battery < minimum voltage or
• Ambient temperature < 25 F

![A diagram showing the AESS system with shutdown and restart conditions.](image)
FUEL OPERATED HEATER (FOH)

Advantages

• Modest space required
• Provides warming of main engine jacket water and/or lube oil
• Uses fuel from main engine tank and uses fuel more efficiently than APUs for heating
• Effective in Winter, not typically used in Summer

Disadvantages

• System requires AESS or manual start
• Air pressure may still require main engine start
• Requires modest 120V plug-in connection or battery draw to operate
• If battery powered, AESS may restart locomotive to maintain voltage despite being warm
DIESEL AUXILIARY POWER UNIT (APU)

Advantages

- Can cycle on/off automatically
- Can provide battery charging
- Coolant/Oil heating for main engine
- Can run small electric air compressor
- Effective in Winter, can completely prevent main engine starts

Disadvantages

- Has a large footprint
- Requires additional fuel and electrical connections
- Can still be noisy (albeit at higher sound frequency than main engine)
- Can be expensive to maintain
SHORE POWER
PLUG-IN JACKET WATER HEATER (JWH)

Advantages

• Small space required on locomotive
• Provides warming of main engine jacket water
• Typically uses natural circulation rather than pumps
• Can be combined with battery charger to maintain locomotive batteries and ground air to maintain brake pressure
• **Effective in Winter and summer, prevents main engine starts**

Disadvantages

• Must manually shutdown main engine and plug in, operator intervention
• **Requires more expensive, substantial 240V/480V Shore Power plug-in connection to operate, which relegates its use to a dedicated parking location but logical if Shore Power is required for passenger car HVAC**
EPA SMARTWAY VERIFIED PRODUCTS

APU
Kim Hotstart
PowerDrives, Inc.
IMPCO Ecotrans

FOH*
A.S.T. Group
(requires AESS)

AESS
GE Transportation
Motive Power
ZTR Control Systems

*Kim Hotstart and PowerDrives, Inc. offer FOH’s, however they are not verified by EPA under the SmartWay Program
"GENSET" LOCOMOTIVE

- Integration of AESS and large “APU” engines, (1 gal/hr vs. 4 gal/hr idle)
- Can facilitate the use of DPF equipped Interim Tier 4 non-road engines
- Non-road engines use Glycol coolant, do not need to be “warm”
- Potential for significant fuel and emission savings
- Decreased noise levels, when off and when operating, DPF’s are mufflers
OTHER WAYS TO ACCOMPLISH THE GOAL

Switcher Locomotive ➙ 2,300 HP ➚ Line Haul

Mother Slug

• “Mother” locomotive produces electricity
• Transfers power to second “skeleton” locomotive for added tractive effort
• Can cut fuel consumption by 1/3 (compared to two regular locomotives)

Other Possible “Genset” Configurations

Two Engine

• 2 Small 700 HP Switcher
• 1 Small 500 HP, 1 Large 1,800 HP Switcher

Single Engine

• 1 Large 2,200 HP Switch Locomotive/Non-Road engine
• 1 Large 2,305 HP Line-Haul Locomotive/Non-Road engine