

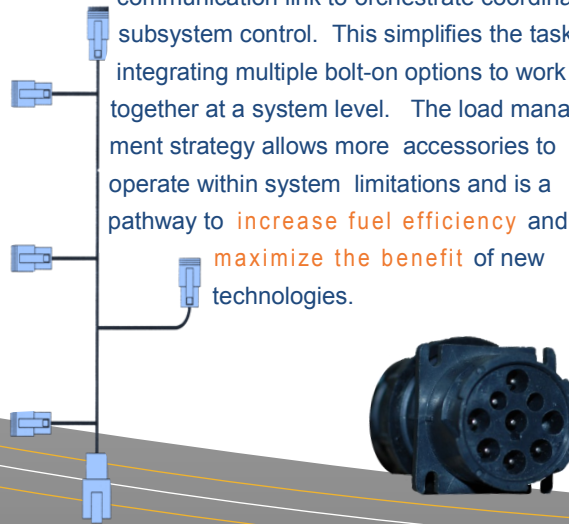
Coordinating Accessory Management for Urban Bus Applications

The **Vehicle Smart Grid™ (VSG)** from DCS leverages the wealth of information available on the vehicle communication link to manage and prioritize loads to achieve a system efficiency that is unparalleled with current technology. The smart grid solution incorporates supervisory control to balance the ever increasing complexity and interdependence of subsystems on heavy-duty vehicles.

Urban bus accessories provide vital services under extremely harsh duty cycles. Subsystems tied to the engine are traditionally over designed to support worst case operation which typically occurs over very small percentages of the duty cycle. Over-design, engine operating constraints and lack of coordination at a system level lead to inherent system inefficiencies. To increase system efficiency, OEM's off-board engine driven accessory loads onto the vehicle electric grid to decouple from the engine. This strategy allows for right-sizing components for the actual duty cycle but requires intelligent control to ensure efficient operation. Effective load management is the key to incorporating multiple electric and conventional accessory options as they compete for limited vehicle power resources.

Knowledge is Power

The information is out there but is anyone listening? The **VSG** takes full advantage of the communication link to orchestrate coordinated subsystem control. This simplifies the task of integrating multiple bolt-on options to work together at a system level. The load management strategy allows more accessories to operate within system limitations and is a pathway to **increase fuel efficiency** and **maximize the benefit** of new technologies.



Vehicle Smart Grid™ solutions will:

- Realize efficiency gains through load management
- Prioritize load scheduling based upon accessory power consumption and available power from the vehicle
- Provide seamless integration with multiple bolt on options
- Manage interdependencies of multiple subsystems
- Take advantage of low cost energy when available to drive accessories
- Adapt control algorithms to driving conditions and accessory usage
- Take advantage of synergies that exist at a system level to optimize control
- Apply solutions that enable retrofits for older systems

Diagnostics and Prognostics

How many gallons of fuel are wasted running accessories that operate continuously in a fault condition without indication to the mechanic? With **VSG** oversight these accessory subsystems are continuously monitored for conditions which affect fuel consumption. This means no more running fans in default operation due to a failed sensor and protection against heavy power discharges that risk damaging batteries. Saving fuel means applying prognostics and diagnostics at a system level to identify failed or failing components that affect the bottom line.



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