



## Turning Buses And Trucks Into Hybrid Vehicles

I recently had a chance to visit Odyne Corp., a seven-year-old company based in Hauppauge, N. Y. It develops plug-in hybrid electric power trains for medium-heavy-duty vehicles. While I was there, I met with its director of engineering, Dana DeMeo.

I had worked with Dana when he was in college. His expertise then was in repairing all sorts of electronics equipment for his college buddies. Now, he's in charge of developing the embedded system that controls the hybrid functionality.

### GREEN DESIGNS FOR A GREEN PAYOFF

During "hybridization," a standard vehicle's transmission is removed and replaced with two electric motors—one hooked up to the driveshaft and the other to the engine's flywheel. This is called a series-hybrid configuration. Odyne provides its hybrid components to partners who perform the installation.

When Dana showed me the motor on one of the buses, I was impressed. It was about the size of a 30-gallon drum. Two arrays of 25 12-V batteries are then fitted to the underside of the bus to power the motor. The embedded system controls the main motor and other smaller motors. Dana then took me for a ride. The main differences for the bus are smoother acceleration and regenerative braking. And, there's no engine noise.

Dana hit the pedal and we took off, looking every bit a normal bus to anyone we drove past. As soon as Dana removed his foot from the "gas" pedal, the regenerative braking kicked in to slow the bus and recharge the batteries. The control system also emulated a typical automatic transmission, creeping along rather than stopping altogether.

The control system utilizes eight different printed-circuit boards (PCBs) distributed throughout the vehicle. Each PCB uses a dedicated FreeScale MCORE microcontroller and coordinates a specific function, such as battery management, engine management, and electric propulsion. The PCBs are connected together using the industry-standard CAN bus. One of the PCBs is a master controller that coordinates the functions and communication of the entire system.

Why would a bus company convert its fleet to plug-in hybrids? For starters, the switch is a good environmental choice, and with much of the world thinking green, a good public relations move, too.

In addition, Dana said that the return on investment (ROI) of switching to hybrid operation used to be the life of the vehicle—not a compelling economic argument, in my opinion. But the economics are better today, since the price of oil affects ROI calculations. As the price of oil continues to rise, the Odyne system naturally becomes a more attractive investment.

### ELECTRICITY PROVIDES A LIFT

The company has also released a design for a parallel hybrid vehicle. Many companies, such as utilities and telecom firms, use trucks with an aerial lift. The lift raises a worker standing in a bucket to a height needed to work on power or cable lines, trim away tree branches, and so forth.

The power for the aerial lift in a standard truck comes from the engine. Once the workers reach the site, they have to keep the engine idling to use the lift and to keep the cab warm or cool, depending on the weather.

Instead of replacing the transmission on trucks like these, Odyne's system adds an electric motor for a transmission "assist" (*see the figure*). The battery arrays primarily power the aerial lift and cool or heat the cab. Odyne also supplies 110- and 240-V ac power outlets for the truck. Hybrid systems in these types of applications reduce overall fuel consumption by more than 50%.



Odyne Corp. supplies hybrid components to partners who install them into medium and heavy-duty vehicles. Dueco installed the components into the aerial lift truck above. Now crews don't have to keep the engine running when they're operating the lift.

I then got to ride in one of these vehicles. Although I have never been in this particular kind of truck before, it was very similar to riding in any truck with an automatic transmission. You simply start it up, tap "D" on the transmission console with your finger, and drive off. The same benefits were in effect as with a series hybrid vehicle, with better pickup and regenerative braking and reduced fuel consumption.

When we returned to the Odyne lot, we got to work the aerial lift. With the engine off, the lift operated strictly from the batteries. Simply pushing its controls raised and lowered its arms. None of the Odyne guys nor I wanted to get in the bucket, even though it was fairly easy to raise it and bring it back to its base with a soft landing.

Not having the engine idling for several hours while the lift is operating is a real gas saver. Plus, you don't have to worry about pollution and engine noise, which could be a concern in residential neighborhoods. For more information on the company or its products, go to [www.odyne.com](http://www.odyne.com). ☎