

Pallet cleanser

HOW CAN YOU GIVE A FRESH NEW TASTE TO SOMETHING AS SIMPLE, STANDARDIZED AND UBIQUITOUS AS THE POWERED PALLET TRUCK? THE LATEST CONTROLLERS, SOFTWARE AND GAUGES ARE A GOOD PLACE TO START

Value, or in other words, high performance at an affordable price, is everything in the 'walkie' powered pallet truck market. Because end customers have relatively uniform demands for these battery-powered electric warehouse vehicles, manufacturers have been able to keep costs down by employing highly integrated subsystems and standardizing on mature technologies.

For example, the truck's lift/lower function is achieved using a DC series motor, hydraulic pump, reservoir and flow control valves that are commonly integrated into a single compact unit. This hydraulic 'power pack' saves costs by simplifying installation and reducing the number of hydraulic connections. The traction motor is nearly always a robust AC induction motor. In terms of batteries, despite the newer technologies coming to market, the vast majority of powered pallet trucks still use the well-proven and economical lead-acid variety.

But there is a downside to achieving economy through standardization: it also limits manufacturers' options for meaningful product differentiation. With many of the basic components of a pallet truck fixed by market needs and cost pressures, where are OEMs going to find the opportunities to set their products apart, get to market quickly, or respond to customers' application-specific or regional requirements?

The answer lies in the vehicle's electronic devices: the AC motor controller, the display that it talks to, and the shape and ergonomics of the tiller module handled by the operator.

A customizable command center

On Class III pallet trucks, the traction motor controller is the most likely device to be the center of system integration and adaptation. The motor controller must be flexible enough to adjust to the vehicle's varied communication needs and features, as well as being easy to set up, program and update.

Curtis Instruments' new model AC F2-A motor controller, in association with the new model 3140 CANopen gauge and new Curtis Integrated Toolkit software, provides manufacturers with a way to deliver more economical, but still highly customizable, vehicles. This fully CANopen-compliant controller has been specifically designed for the powered pallet truck market. Smaller, faster and lower in cost than



previous models, this compact 24V 200A unit runs any AC induction motor smoothly and efficiently, while its dual 32-bit microprocessors run faster than those of any previous generation.

In comparison with earlier systems, the dual processors in the new controller provide far greater functional safety. Its built-in motor auto-characterization routines determine the proper set up, while the I/O is perfectly selected to control all the features of this class of truck. Coil drivers for the main and pump contactors, electromagnetic (EM) brake and lift/lower valves have useful control modes, including pull-in and hold functions, current control and voltage compensation.

Thanks to built-in CANopen support of Service Data Object (SDO), Process Data Object (PDO) and Network Management (NMT) functions, the new controller arrives ready to satisfy many standard requirements and act as the 'system master' or 'vehicle manager' of any truck. But, the most meaningful difference in this model is that every

adjustment and feature can be easily controlled and accessed over its CANopen port, with fast and flexible software-based customization enabled by the Curtis Vehicle Control Language (VCL).

To date, the new controller provides the largest memory space for VCL code, providing for 4,000+ lines of customized code and 200+ custom parameters and variables. Even the wiring of the vehicle to the controller can be software-controlled through the extremely flexible I/O. Inputs/outputs for standard features such as forward/reverse and interlock switches and drivers for main and pump contactors or the EM brake are no longer fixed to single predefined pins but, if desired, can be relocated by simply adjusting the appropriate parameters in the controller.

New VCL features provide an easy interface to a CAN-based tiller, reducing wiring and allowing more features than in a standard wired tiller. Enhanced VCL mathematical functions include a full range of trigonometry operations that help deal with unique vehicle configurations.

LEFT: **CANbus communication between electronic devices is the key to differentiating your vehicles in the competitive and cost-conscious Class III market**

RIGHT: **Now you can design low-lift pallet trucks, also known as 'walkies', with the new Curtis model AC F2A motor controller that talks to the Curtis 3140 CAN gauge**

New error-logging features in the controller give the user a better view into the history and conditions of operational issues within the device. The OEM can create custom fault responses and logs to further enhance vehicle maintenance and repair. OEMs can also now create a customized menu, stored in the controller, which provides the field technician with just the right information, scaled and organized exactly as desired.

Economical and flexible display

The model 3140 CANopen gauge was also specifically designed for the Class III market, providing OEMs with a low-cost, easy-to-read and completely flexible display option. More importantly, it has been designed to provide out-of-the-box integration with the Curtis AC F2-A CAN-based controller.

The new CAN gauge uses a high-contrast 16-segment LCD with LED backlight to provide crisp display of a full alphanumeric character set (nine characters in two rows of three and six characters), so that any message can be displayed. Icons are included for normal functions such as hour meters, fault indications and battery state-of-charge. Long text messages can scroll, offering manufacturers virtually unlimited flexibility in the information they can present to operators. The device's CANopen interface is well defined and simple to use, enabling OEMs to tailor the device to any application and to display any data from the motor controller concerning the vehicle's present operating characteristics.



Sole-source convenience

For manufacturers who want the simplicity of one vendor supplying and pre-integrating a vehicle's electronic components so that they work together, Curtis Instruments can also provide an ergonomic and economical tiller head, main and pump contactors and a new CAN-based high-frequency onboard battery charger. Supporting easy and convenient opportunity charging, the new charger maximizes vehicle run-time. CANbus connectivity enables the new controller to monitor the battery throughout its charge and discharge cycles. By writing the appropriate code in VCL, manufacturers can help owners maximize battery life by sending messages to the display to inform the vehicle operator as to the state of charge, when to charge the battery and when not to charge it.

The gauge also offers an optional built-in heater, so that it can reliably display operating information for vehicles used in freezers or other cold environments.

Software toolkit simplifies integration

While the new CAN-based motor controller and companion gauge achieve new levels of economy and flexibility, an equally important development is the Curtis Integrated Toolkit software that makes their unlimited versatility easy to exploit. In fact, the Toolkit is a required element in customizing any vehicle incorporating the controller and display, as the basic controller includes only a standard set of functions.

The Curtis Integrated Toolkit provides everything needed to set up, diagnose, program, record and work with the new devices. Using a special secure interface protocol on the CANbus, the toolkit can download VCL programs, set parameters and create 'virtual gauges' to monitor critical variables. The tools can provide CAN data traces and transmit custom CANopen messages, with CANbus binary data translated into plain readable text — in whatever language the developer chooses. Custom VCL software can be developed, debugged, compiled and loaded into the controller, all from one integrated PC toolset.

The adoption of the CANopen bus opened the pathways to a broad range of compatible devices. But CANopen compatibility only means that devices can effectively communicate, not that they will. Integrating them into a working system has always required programming, modification and setup. Unfortunately,

the CANopen protocol can be an extremely esoteric environment in which to work.

The Curtis Integrated Toolkit software makes even the most complex integrations possible, simplifying the process of developing a vehicle that works exactly the way the OEM wants it to. VCL was already a fairly easy language to learn, and the new software makes integrating CANbus devices even easier. Some OEMs will no doubt keep programming for the new devices in-house (with Curtis training, if needed), as a way to better protect their intellectual property, but for those who prefer not to do it themselves, Curtis application engineers worldwide are always available to write the custom software for the OEM.

In a mature market in which many mechanical design choices are predetermined, the key to producing a successful, economical and differentiated low-lift pallet truck is the interaction of its electronic CANbus devices, supported by the tools to integrate, optimize and maintain the overall system.

The availability of Curtis Instruments' latest CAN-based motor controller, display, compatible tiller head and Integrated Toolkit software gives material handling manufacturers all the flexibility they need to respond to their customers with competitive vehicles that meet their increasing demands for performance, functionality and economy. **ivt**

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