



## Putting the Brakes on Costly Applications

**ETHERNET Powerlink -based solution saves time and money.**

As automakers turn their attention to fuel-efficient vehicles, new manufacturing challenges arise. For example, capitalizing on nascent technologies such as regenerative braking is a great step forward, provided you can reduce the already higher production cost of hybrid vehicles.

Such was the challenge a US automobile manufacturer faced when they began engineering hybrid versions of their cars. The automaker designed into its vehicles a regenerative-braking system, which captures kinetic energy normally lost to heat when braking, and converting it to electric power. The system includes a generator with copper windings that need to be coated with contamination-resistant powder.



Uncoated generator parts are gripped, picked up and rotated, then transferred into the powder coat process with custom Parker mechanics and controls.

Providing a system to coat the windings is HeatTek of Ixonia, Wisconsin. The challenging application required HeatTek to fit the equipment into a very limited production space. Additionally, there was a large moment load requirement to maintain repeatability due to a single-stanchion mounting location for the mechanics. Given the challenges involved, HeatTek turned to motion-control integrator Sure Controls. Together, the two companies worked with Parker's Electromechanical Automation Division to design a custom motion solution capable of hitting the repeatability spec while maintaining the small work envelope. The motion system that was selected consisted entirely of Parker Hannifin electromechanical products, including Xpress HMI, ACR controls, Aries drives, MPP motors, PS gearboxes and HPLA and ET series mechanics.

The biggest application challenge was to fit the mechanics within the allowable space envelope. "Essentially we needed to fit a gantry-style system into the space that a compact robot typically operates within," says Tom Widmer of Sure Controls. Multiple customizations were made to the stanchion mounting, motor orientation and cable track routing of the HPLA series mechanics to minimize the overall footprint.

On the electronics side, the ACR9040 controller and Aries EPL servo drives were chosen for their

ETHERNET Powerlink (EPL) motionbus technology, which among other benefits allows the machine to take full advantage of Parker's Drive Talk feature. With Drive Talk, the ACR controller automatically accesses Aries drive parameters for advanced control, display and diagnostics in a seamless mapping between the two devices. "This gives the system a higher level of control and safety while performing multi-axis coordinated motion," says Widmer. "The EPL also gives us a fast method to provide axis-related information like fault status and performance values to the machine operator through the Parker Interact Xpress HMI." The standard Ethernet communication cables used for controller to drive communications with the EPL motionbus also reduced installation time and complexity.



Closeup view of Parker's ETHERNET Powerlink enabled 9040 Controller and Aries drives. The controller and drive are set up and programmed from the same software package, lowering startup and installation costs.

Peter Caine, HeatTek vice president, explains that accuracy is paramount for the powder epoxy pre-heat-and-cure system. "We load an uncoated part onto what is essentially a rotary table consisting of 11 radial spokes. After 11 index moves, the system has turned one revolution and the part has gone through 11 stations," he says. The system indexes to the next station every three minutes. The uncoated part first goes through three pre-heat stations. "At the fourth station, there's a pick-and-place unit where we loosen the part on the fixture. The X-Z pick-and-place grabber then moves over the part, grabs it and moves it radially outward. The part is then turned 90 degrees, and travels down the Z axis for the powder epoxy coating application." After the powder application, the process is reversed and the coated part is put back on the fixture where it's indexed into five post-heat stations and then back to the 11<sup>th</sup> and final unload station. "The critical part for us was grabbing the part in the correct position while rotating and supporting it without letting it fall. It's a 30-pound part and the accuracy of the vertical Z-axis travel is critical to meeting up with the powder epoxy application."

Caine says that the machine won't be processing the same part every time, but it's smart enough to accommodate a number of different parts with an easy parameter change on the HMI. Programming of the Parker system was easy to work with. "Our guys were able to manipulate it as needed with some training from Sure Controls." In comparison, on an alternate job HeatTek was recently required by a customer spec to use a different motion supplier. "We did not have as much luck with that particular system," Caine said. "We never experienced those problems with the Parker system."

HeatTek engineer Mike Javoroski agrees. "By using Parker components, HeatTek and Sure Controls were able to provide an epoxy powder dip system in which the process variables were easy to change," he says. "The Parker servo system provided the positioning control needed to process the part in a repeatable motion profile. The motion profile speed, position and timing were easily adjusted using a human-machine interface. By having Sure Controls provide the controls and software, HeatTek was able to reduce the development and testing time for the whole system."

Widmer adds that the EPL solution resulted in a lower-cost programmed solution due in part to simplified system setup. "Since the EPL network accommodates Drive Talk, our engineer saved time while setting up the system," he says. "We were able to set up and program the ACR controller

and the Aries drives from the same software platform. Without EPL we would have had a minimum of \$1000 additional labor on this system.”

Simplifying automation processes and reducing overall machine equipment costs are critical steps forward in the reduction of hybrid vehicle costs. By choosing system solutions that work together featuring Ethernet motionbus technology, HeatTek, Sure Controls and Parker are working together to advance hybrid automotive technology, making it more affordable and available for all.

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