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The Evolution of the T6000

In this article, new hardware platform components, modified packaging, software improvements, and changes to communication protocols will be discussed. All of the improvements mentioned will be introduced later this year. Each performance enhancement discussed will be directly applicable to the installed base of Emhart Glass T6000s.

Introduction

When developing a new control system for a production environment, one must always keep in mind the installed base of the controls. Since electronics technology advances so rapidly, it is almost impossible to take advantage of new systems without affecting current ones. Emhart Glass research engineers always plan for the provision of backward and forward product compatibility in new electronic products, as well as economical upgrade paths to ensure that existing customers' systems can remain up to date.

Hardware Platform

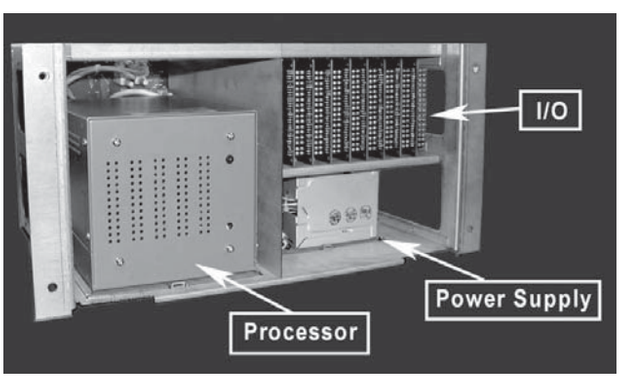
The Universal Section Control hardware is based upon standard industrial PC technology that utilizes a single board computer. Since the system supports processor speeds ranging from 166 MHz to 1 GHz , it allows the support of legacy products that use slower processors, while also addressing both current and future needs. The system is equipped with a passive backplane that has 4 PCI slots - one for the CPU and 3 expansion slots to permit the addition of future capabilities. There is also an Emhart Glass custom I/O backplane that houses connections for signal conversions (RS232 - RS422), counter timer function, synchronization interface, maintenance stop interface, and the watchdog timer function. The Universal Section Control supports several communication protocols and is equipped with two Ethernet ports (100 base T), one Arcnet port, and two RS422 ports. Arcnet and RS422 ports have been incorporated for the support of Hand Held Terminals and the existing installed base of Emhart Glass products requiring the Arcnet protocol.

The new hardware platform also boasts upgraded input and output cards. The new input cards have 32 inputs per card with 1200-volt optical isolation. In addition, each input has an LED annunciator. The new output cards also have 32 points. Each individual output is rated at 1 Ampere and is electronically short circuit protected (no fuses). The card can sense when an output sees either an overcurrent or open circuit condition and can indicate an alarm. As with the input card, each output has an indicating LED.

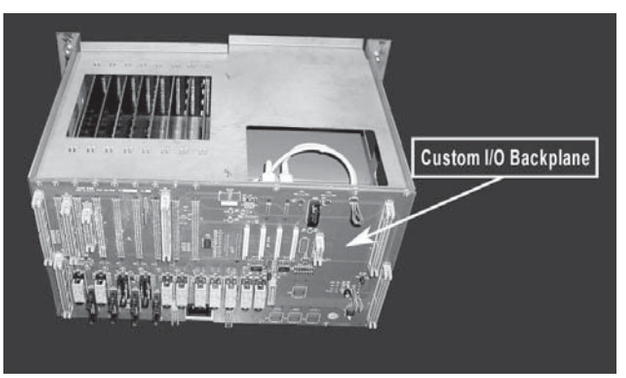
Future products related to the Universal Section Controller will require the use of analog inputs and outputs. Because of the demands of the container forming process, the analog I/O must be robust enough to survive in all possible situations - ranging from embedded control in the IS / NIS Machine sections to forehearth control applications. For versatility, the operational ranges supported are 0 – 10 volts, -10 – +10 volts, and 4–20 ma. Digital resolution is 12 bits.

Packaging Issues

To accommodate the hardware advances that were made, a new packaging philosophy was adopted. The idea was to design the Universal Section Controller to be a separate entity that



Front View of Universal Section Controller.
Photo: Emhart



Rear View of Universal Section Controller.
Photo: Emhart

could be assembled and tested apart from the entire system. This modularity allows for ease of assembly at the factory level, as well as ease of access in the field for troubleshooting process issues or making equipment upgrades. The newly arranged section controller cabinet provides improved cable management and, consequently, an easier construction of the cabinet as well as easier installation in the field. Figures 1 and 2 show the Universal Section Controller in front and rear views.

Software Platform

To take full advantage of the newly established hardware platform, Emhart Glass has identified VX Works® as the new real time operating system of choice. VX Works [1] provides an environment to very efficiently develop new, advanced features for all aspects of container forming products. As more and more servo mechanisms replace traditional pneumatic mechanisms it becomes increasingly necessary to manage the motion of the servos to avoid unwanted interferences, and to manage motion profiles that optimize glass handling for fewer container defects. VX Works can be applied to all existing T6000 and TNIS controls as well as all of the Emhart Glass AC Brushless servomechanisms.

Conclusions

In order to meet the increasing demands of the container forming industry, Emhart Glass recognizes that it must provide products that help its customers become more competitive – not only among glassmakers, but also with the producers of alternate forms of packaging. Recognizing the significant investments in capital equipment made by its customers over the years, Emhart Glass remains committed to providing both hardware and software upgrade paths for its legacy products. As new products are developed, backward and forward compatibility of systems is maintained. This allows older products and new products to operate in harmony, so customers can feel comfortable that any evolution of the T6000 to provide more capability also considers the existing installed base of equipment.

[1] VX Works is a registered trademark of Wind River Inc.

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