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Volume 4 Issue 4

# Entertainment Engineering

## FLUID SIMULATION

Special Effects In Cinema



**NEW TWIN CAM  
96 ENGINE**



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A NEW VOICE**



**TERMINALS AND  
CONNECTOR HOUSINGS**



**NEW In This Issue: Entertainment Engineering TV**



# Slots and Video Gaming Products Rely On Unique Terminals and Connector Housings

New connector design uses terminals assembled into a connector housing at the harness assembly point

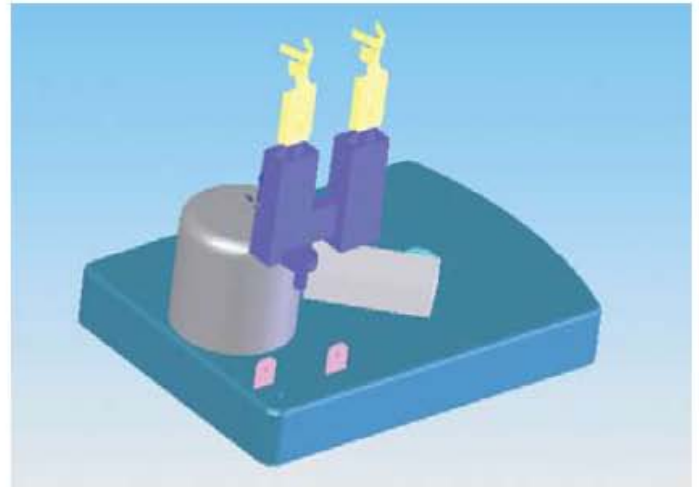
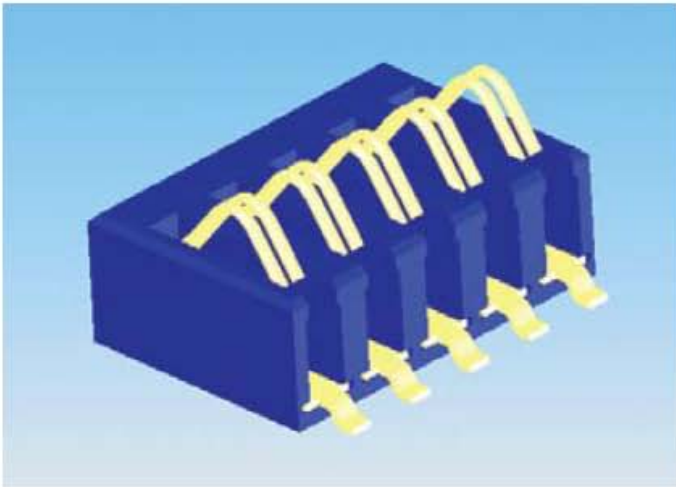
International Game Technology (IGT), a manufacturer of spinning-reel slots and video gaming products, recently worked with engineers from ITW Pancon (Bolingbrook, IL), to design a custom-engineered button panel connector that is mounted on the IGT switchboards. The new connector simplified the company's manufacturing and assembly processes and ultimately reduced testing and repair costs.

"We used to do a multiple step process in manufacturing, which was simplified by the ITW product that combined several steps into one finished product that can be installed all at once," says Cyndi Wagner, a Design Engineer with IGT.

Wire harnesses for slot machines had traditionally used individual "quick-connect" style crimp terminals. When the wire harnesses were assembled to the push button/lamp terminals on the machines, the assemblers were required to plug five individual terminals onto tabs. This allowed for the possibility of incorrect wiring of the components, which eventually increased the company's cost for troubleshooting to correct errors discovered after products left the supplier's factory. When servicing the machines in the field, technicians work in tight areas, making it difficult to replace push buttons since they must unplug and replace many individual wires.

IGT had already been a customer of ITW, but the company's new Game King and S2000 lines of spinning-reel slots and video gaming products presented an opportunity to address quality issues with the harnesses they were using.

Part of the problem was miswiring at final assembly. The harnesses were received with five single terminals for each push button assembly, making it very easy for the assembler to make the wrong connection. "By changing to terminals that were preassembled into a custom housing designed specifically for the button assembly, the IGT harness manufacturer was able to test each harness before shipment to IGT," explains Ken Irish, an ITW Pancon Product Engineer who helped



develop the innovative design. "Since each connector can only be mated one way, rework due to miswiring was eliminated."

IGT had a space restriction behind the button assembly, so Irish and other ITW Pancon engineers designed the terminal with a right angle or what they call a "flag" type design. This design allows the wires to exit at a right angle from the button.

The new connector design uses terminals that are assembled into a connector housing at the harness assembly point and are tested before shipping to the machine assembly location. The connector is polarized, meaning that it can only mate to the push button/lamp assembly one way, which eliminates the possibility of miswiring. When technicians replace push buttons now, they only have to unplug and replace a single connector per button.

The assembly process at IGT's wire harness supplier was improved since all five connections could be tested at once rather than five individual connections. There was significant time savings since rework of miswired button connections was the primary quality issue they encountered. Because of this, throughput could also be increased.

The terminal is designed to mate with standard .110 tabs as well as a ground pin. ITW Pancon's .110 Tab Crimp Style SWITCH-CON contacts and housings provide a "fast and reliable" alternative to conventional

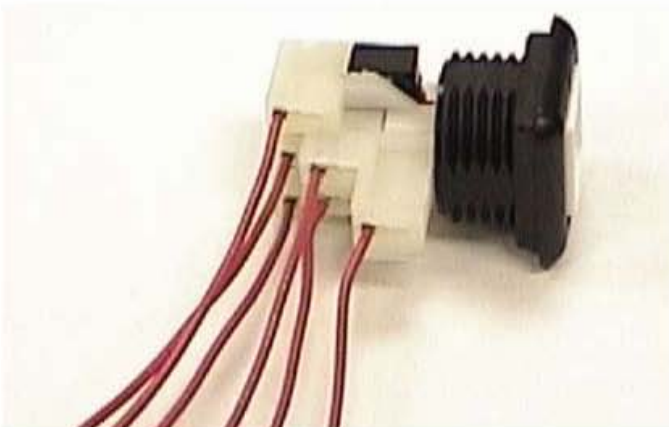
quick disconnects. The right-angle crimp contacts are designed to be used with custom housings for customer-specific applications like the one with IGT. When paired with a custom housing, the .110 Tab SWITCH-CON provides a connection that is easy to assemble and easy to install.

The .110 tabs are suitable for use in a wide range of applications involving switches, lamps, coils, relays, timers, motors, and solenoids. When inserted into a custom housing, the contacts offer more reliable connections (due to the polarizing nature) and eliminate the problem of installing the wrong wire on the wrong tab.

Contacts (CRSW22SD) may also be used on .110 tabs in a variety of applications. . The contacts are supplied on 24 inch reels for use with the automatic applicator (CACSF-22).

Available assembly tooling includes an applicator (CACSF-22) which is a mini-die format for use in industry standard presses and allows up to 2 wires to be terminated at a time. A hand tool (HTCR-110-22) for field repair, and an extraction tool (ECTR-110) for removing the contacts from housings are also available.

SwitchCon products can be designed to plug onto .110, .187, and .250 tabs and the configurations or quantities of them on any given switch can be numerous and typically custom. Once ITW Pancon engineers have the contacts for a particular tab size, a custom housing to plug onto a specific switch is all that is needed.





## **Patented Crimp Contact Designed for Custom Applications**

Individual “Quick Connect / Disconnect” terminals have been used across many industries for decades. For applications requiring single connections, these contacts are an inexpensive, common choice for numerous applications. However, when multiple connections must be made in close proximity to one another, individual Quick Connects / Disconnects present a potentially significant problem. During assembly, unintentional miswiring may occur. This miswiring of terminals is known to cause high rates of quality problems resulting in costly time to troubleshoot and correct the miswired connections. One solution to the problem is grouping the individual connections together allowing operators to make a single insertion. However, due to the high insertion and withdrawal forces required to mate and un-mate the common Quick Connects / Disconnects, they cannot simply be grouped into a plastic housing. Due to their design, the mating forces for multiple connections are too high for an operator to connect by hand. This means a tool would be required to make the connection, but the potential for damage caused by the tool to other components around the connection point is another concern.

ITW Pancon’s solution to this problem is the newly patented crimp contact. The contact is designed specifically to work with multiple connection points. The contacts are grouped in a plastic housing that will allow for a single insertion. The unique patented features of the contacts provide lower insertion and withdrawal forces, but maintain the critical normal forces required for a “gas-tight connection” as required by industry standards. Grouping of multiple connection points also allows for “polarization” so that the connector will only mate with the terminals one way. This feature reduces assembly time and eliminates production quality issues due to miswiring. These benefits result in a lower total installed cost.