by Jill Russell, *Contributing Editor*

Appliance®

A Luminous New Control Panel

Whirlpool worked with a control supplier to achieve a dramatic look and responsive controls in its KitchenAid French door, bottom-mount refrigerator.

Whirlpool Corp. knew it wanted to do something different with the main user interface and interior deli tray controls when it started work on its latest KitchenAid refrigerator.

Whirlpool wanted a clean, seamless look that featured touch-sensing capabilities with lighting. The membrane-style sensor the OEM used previously couldn't handle the specifications of the new design: a main user interface with ring lighting, an indoor deli bin control with interior lighting and independent operation from the other drawer and unit, and cleanability.

Whirlpool had worked with control panel supplier TouchSensor previously. When the refrigerator design team saw what TouchSensor had provided for previous Whirlpool oven and dishwasher designs, they knew their refrigerator control panel could be realized.

"The previous [refrigerator] models had decorative overlays but were mechanical switches," says Dennis Staley, electrical and controls engineer, BIR (built-in refrigerator) launch team for Whirlpool. "The functionality was fine, but we wanted to upgrade the look and styling to give it a more modern feel."

The field-effect sensor in the KitchenAid refrigerator control panel is sensitive enough to activate upon a light, human touch, but smart enough to differentiate that from cleaning-wipe contact.

The winning design featured field-effect sensor technology and assembly from TouchSensor.

"Whirlpool's design provided us the aesthetic intent, functional intent, and envelope to work within," says Mark Burleson, TouchSensor's mechanical engineer responsible for the main user interface. "TouchSensor then designed the electronic hardware, software, and mechanical construction to meet that intent within the envelope provided."

Although the specifications were spelled out by Whirlpool, and TouchSensor provided components to meet them, challenges did arise along the way. One example involved the ultralow-profile lighting of the deli trays. Whirlpool requested the shelf be no more than 5 mm thick, half of what previous designs featured.

To obtain the thin profile, TouchSensor developed a new connector system. "We had to narrow the board, and instead of using connectors we hand soldered the wires to the board so that we could achieve a 100% surface mount to the shelf," explains Mark Mathews, electrical engineering manager at TouchSensor, who was responsible for the deli user interface. The number of wires was also reduced from three wires (as used on the main interface) to two for the deli tray controls.

Additionally, the lighting, communication to the control, and thermistor are integrated on the design, making the trays completely independent of the unit and each other as Whirlpool requested.

The project really gained ground when TouchSensor determined it should use a single LED in the center of the deli tray shelf and add reflectors to achieve the brighter light Whirlpool was looking for. Additionally, the main user interface featured soft, blue ring lighting.

The design called for a glass-like smooth

TouchSensor provided Whirlpool a custom solution by working with the OEM's preferred supplier. The end result is a glass-like, injection-molded control panel both for the main user interface (shown) and controls for two independent deli trays.

surface on the control panels. Whirlpool chose an injection molding process that etched all graphics on the inside of the panel. This was then placed over the printed circuit board (PCB) that TouchSensor had designed. According to the supplier, this approach increases durability by decreasing wear during the product's lifetime.

TouchSensor worked with one of Whirlpool's preferred suppliers—which had worked previously with the substrate material—as well as with a preferred injection molding supplier. The end result was a component assembly that includes the user interface module, electronics, lighting, and the injection-molded interface. Whirlpool installs the assembly into the KitchenAid refrigerator on its assembly line.

Whirlpool was thrilled with the results, particularly cleanability tests. Staley describes the testing: "You can lay your finger on the touch cell and it will work immediately. However, you can take a towel and wipe the display and it won't activate. That is the thing that really sets TouchSensor apart from the other sensing technology suppliers out there."

Already on the market for a year, the KitchenAid French door, bottom-mount refrigerator boasts 22.5 cu ft of interior volume. A quick-chill timer lowers the temperature for a short period of time to chill a freshly stocked appliance, then brings the temperature back to normal. A holiday mode shuts off nonessential functions, such as the user interface, lights, and alarms.

Both the project and the Whirlpool/TouchSensor relationship were viewed as all-around successes. "This project was custom to Whirlpool's specifications and we built the technology from the ground up," says Don Mueller, mechanical engineering manager for TouchSensor. "This project has definitely cascaded into other projects."

Andy Livingston, electrical engineer for TouchSensor, who worked on the main user interface, agrees. "It was a very good-looking unit and it was a great relationship. We previously worked on at least 25 products in cooking that have gone into production. We are always working with Whirlpool to push the envelope and design and come up with new ways to be innovative and put out a good product."

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