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Thermoformed tray takes abuse

By Staff

Engineers at Philips Medical Systems, Andover, Mass., faced a problem when designing a tray for accessories used during ultrasound exams.

Patients would often use the tray for leverage to pull themselves out of bed.

The manufacturing option ultimately chosen for the tray was twin-sheet thermoforming. The process creates hollow parts by molding two sheets of plastic simultaneously. The halves fuse together under heat and pressure inside the mold, eliminating the need for adhesives.

The process improves the mechanical transition between surface planes and gives designers freedom. For example, parts can have different contours on opposite sides. Each side can also be a different color, type, and use material of different thickness.

Specialty Manufacturers Inc., San Diego, made the trays. According to Haydn Forward, SMI vice president of sales, several factors complicated the choice of material, including the need to withstand aggressive cleansers, impacts, and abrasions. The team eventually settled on Kydex-T, a proprietary polymer alloy from **Kleerdex Co. LLC**, Bloomsburg, Pa. The material is flame retardant and its elasticity, color consistency, and formability suit the twin-sheet molding process.

To form trays, Kydex-T sheets are heated and pressed against female mold cavities with positive air pressure of at least 50 psi (3.45 bar). Air pressure pushes the sheets against the tools where they pick up fine details machined or acid-etched onto mold surfaces. The two molds press together under heat and pressure, bonding the sheets along mold-designed knit areas. As weld zones form, pressure spreads the weld inward, adding strength to the joint.

The sheet stock used for the tray is custom-colored to match mating components on a cart. Batch-to-batch uniformity and color stability are critical because there's a possibility of field replacements. "The project also called for matching the texture of injection-molded components on the cart," notes Forward. "And Kydex T has the



Twin-sheet molded trays for iE33 echocardiography systems are molded from Kydex T alloy. The trays are hollow yet rigid enough to handle cantilevered loads up to 50 lb (22.68 kg) as patients use them to pull themselves out of bed or technicians use them to pull or push the equipment around.



Kydex T trays undergo posttrimming that forms a clean joint between the tray's two halves, rather than a visible pinch line that would have detracted from aesthetics. Four Nutsert fasteners go onto pins in the forming tool before thermoforming. Fasteners sit parallel to the draw direction and are encapsulated as the plastic deforms around them.

formability and repeatability to accurately pick up the acid-etch texture from the tool while being pressure formed."

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