

SimEx - Iwerks

Switch to high-impact thermoplastic sheet eliminates seat failure in motion theatre attractions

Burbank, CA – Lift off for a voyage to Mars, experience an undersea adventure, or race a volcanic eruption with a pack of dinosaurs. Virtually anything is possible while sitting in one of the motion theatre attractions created by SimEx-Iwerks, Burbank, CA, which not only designs and builds the simulator hardware, but also produces the software and the films used in the theatres. Found around the world at theme parks, casinos, zoos, aquariums, planetariums, science centers, and museums, these simulators, which can hold from 6 to 40 seats in a single cabin, take audiences on thrill rides, pitching, swaying, rolling, and surging with the action on the screen. Of course, with all this motion comes extreme stress for components like seats and wall panels. To handle the stress, SimEx relies on an innovative thermoplastic sheet called KYDEX[®] 100, which is produced by KYDEX, LLC, Bloomsburg, PA. Designed for high impact and frequently specified for aircraft and mass transit applications, KYDEX[®] 100 replaced a failing material and saved SimEx and its customers time and money.



Using electric actuators to pitch, sway, and heave simulators containing from 6 to 40 seats, SimEx is able to immerse audiences into underwater adventures and faraway space flights. Yet, the simulator motion also causes excessive wear and stress to seats and side panels, and requires a high-impact, high-strength material like KYDEX[®] 100 sheet, a proprietary thermoplastic alloy typically enlisted by the aerospace and transportation industries.

Material Durability Improves Product Reliability

SimEx-Iwerks is a full service supplier that guarantees its customers 98.5% operating reliability. The unexpected failure of a seat back or cabin panel results in lost audience revenue and is simply not acceptable. Which is why when polycarbonate seats began to fail after only a few months in service, SimEx, which is headquartered in Toronto, Canada, turned to Toronto-based plastics industrial designers/plastics consultants Gidman Design Associates to find a more durable material.

It was quickly decided that the replacement material should have high impact and flex-crack resistance as well as resistance to the scratching, general wear and fading typical of daily operation.

"We chose KYDEX[®] thermoplastic sheet because it met all of our requirements," explains Claude Gidman, president of Gidman Assoc. "It has reliable colour integrity and is scuff resistant. It's also lightweight relative to its resilience and durability, which is especially important in these moving theater cabins, which hold up to 40 seats and must withstand very high G-forces in every direction."

"Another major factor in our choice of KYDEX[®] sheet was its thermoformability," he adds. "It offers excellent forming properties and crisp detail, allowing us to vacuum form sculpted elements for use in sidewall panels and seats."

A variety of materials were originally considered, says Gidman, including patented Norel[®], various acrylic/PVC alloys, and even ABS. Though ABS had the advantage of easy adherence and parts bonding, it proved no match for the impact and chemical resistance of an alloy like KYDEX[®] 100 sheet. The proprietary sheet offers tensile strength of 42 MPa (6100 psi) (ASTM D-638), Notched Izod impact resistance of 9538 J/m (18 ft-lbs/in) (ASTM D-256), flexural strength of 63 MPa (9100 psi) (ASTM D790), Rockwell hardness of 94 (ASTM D-785), and modulus of elasticity of 2,450 MPa (356,000 psi) (ASTM D-790).

KYDEX[®]

ISO 9001:2000 | ISO 14001:2004 Certified

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Building a Seat that Lasts

Simulator seats and components are produced at a 45,000 sq-ft manufacturing facility SimEx runs in Mississauga, ON. To save on tooling costs and allow for the flexibility of short production runs, the thermoplastic components are vacuum formed instead of injection molded. Vacuum forming evacuates the sealed air space between the heated plastic and the mold.

"From both a design and a manufacturing viewpoint, KYDEX[®] sheet exhibits excellent characteristics for vacuum forming," says Gidman. "It offers impressive formability, extreme hot tear strength, and the ability to maintain uniform wall thickness."

"We love this material," adds Brian Peebles, VP of Operations for SimEx, who helped perfect the vacuum forming operation for the parts. "It is extremely easy to form, yet is highly durable. We couldn't ask for more."

Currently, SimEx has simulator attractions at more than 140 locations from Osaka, Japan and Riyadh, Saudi Arabia to New York City and Las Vegas. In 2004, the company opened a 3D/4D simulator theatre in the Beijing Planetarium in China that features a special "Hurricane" simulator equipped with 48 seats and six degrees of freedom. And in 2005, Walibi, Belgium and Movie Park Germany will both open new 4D Theaters equipped with full-feature 4D FX motion seats.



Seats and other vehicle components are vacuum formed from KYDEX[®] thermoplastic sheet. The material offers superior crack resistance, chemical resistance and scratch/gouge resistance compared to other thermoplastics, including ABS.

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