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## THE GIANT HEART

The Museum's new *Giant Heart* is a vibrant, three-dimensional structure—both virtual and physical—that modernizes the idea of the Museum's old iconic walk-through heart and serves as the centerpiece of *YOU! The Experience*.

The *Giant Heart* stands more than 13-feet high and eight-feet wide. A remarkable structure, it showcases detailed images of a human heart from the inside and out, allowing guests to explore the heart's exterior and interior by zooming in or out through a variety of virtual views of this amazing organ. Cardiac functions that would otherwise be invisible—like the heart's electrical signals and blood flow patterns—become stunningly visible in front of the guest.

As guests encounter this larger-than-life interactive sculpture, they are able to explore how the human heart really looks and sounds. When a guest places their hand on a sensor, located in a kiosk in front of the heart, the sensor recalibrates the beat of the exhibit heart to match the pulse rate of the individual guest. Another interactive station allows a second guest to control the view of the heart; the guest can make it fade smoothly from exterior to interior, and highlight different features and dynamic elements of the organ.

Infused with extraordinary visuals and a realistic, surround-sound environment of a living heart, this remarkable exhibit will give the next generation of Chicagoans an unforgettable encounter with the heart that is in each of us.

### **Conceiving the *Giant Heart***

The Museum collaborated with New York-based Thinc Design to conceive and build the new exhibit. With the charge of creating an unprecedented exhibition on health and the human body, the team wanted to give a refreshing and cutting-edge update to the Museum's popular walk-through heart. Although it had offered a highly memorable experience to guests, the exhibit's static nature had become less compelling as the years passed.

When designing the new *Giant Heart*, the Museum wanted to retain the physical impact and interactivity of the old, yet gain a greater sense of realism, a more sophisticated level of content, and capitalize on the potential of current technology. The new heart should seem alive and inspire amazement, while creating a way to realistically view both the inside and outside of a human heart.

### **How the *Giant Heart* Works**

To make the Museum's new *Giant Heart* truly three-dimensional, a front steel structure was sculpted and contoured shape to represent the shape of the human heart. The structure—four pieces of 14-gauge steel—was constructed by Milgo Bufkin, a Brooklyn-based leading fabricator of architectural metal and fine sculpture. The metal sheets were laser-cut with thousands of precise slots and then perforated with 220,000 individually punched holes within the slot pattern. They were welded together and then expanded into the final, full-relief form—more than 13-feet high.

The visual of the *Giant Heart* is created through seven high-resolution projectors that utilize two layers of video, one viewed through the other. Controlled by the latest image-blending software, five projectors fill the contoured front-image sculpture with stunning, dynamic imagery of the heart's pulsing exterior wall.

Two more projectors, one stacked above the other, generate the rear animations of the heart's interior on a rear-projection screen behind the heart's steel exterior. The perforated front steel screen allows the screen to appear solid when used alone and transparent when the front image dims and the rear image brightens. By carefully modulating the interior and exterior images, a strikingly three-dimensional, "floating" image emerges.

The projected imagery is all original artwork, created by XVIVO, a medical illustration and animation firm based in Connecticut. XVIVO's animations are generated at extremely high resolution and displayed on these multiple projectors through a software program called *Seventh Sense*, which is normally used in state-of-the art digital planetariums. *Seventh Sense* blends the individual image segments seamlessly.

The exterior visualizations show a photo-realistic, normal beating heart, and also elements of blood flow and blood vessels on the exterior of the heart. Interior visualizations include a longitudinal cross section, working valves, blood flow routes, coronary arteries, electrical signal paths, blood pressure and coronary infarction.

Each beat of the *Giant Heart* is an individual animation that is triggered by touch sensors adapted by Life Fitness, a Chicago manufacturer of sophisticated exercise equipment, to work in the exhibit. The sensors signal the *Seventh Sense* software to synchronize the giant heart's beat precisely with that of the individual touching the sensors.

### **An Unforgettable Experience**

Overall, the design of the Museum's *Giant Heart* combines ground-breaking metal fabrication techniques, highly realistic anatomical animation, a complex suite of high-resolution projection equipment, and digital image blending software integration—all to create an unforgettable experience for the Museum guest.

The *Giant Heart* is the result of the support, shared vision and creativity of the Museum of Science and Industry—as well as the dedication and collegial partnership of leading craftsmen and technicians from around the country. These include Thinc Design; Milgo Bufkin; XVIVO; BBI, the audiovisual systems integrator; and Maltbie, the exhibition fabricator responsible for the construction of the overall exhibition.

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