

TOP TECH

U.S. Bank Stadium sets the standard for large facility innovation. BY BOBBY HART

FOR Tony Mulder, there's pride that goes beyond his company's work on U.S. Bank Stadium's 25,000 square feet of high-definition LED displays—the highest quantity and quality of any stadium in the NFL—including 13 HD video and ribbon boards.

Mulder, who has been with Daktronics for 20 years and currently serves as regional sports manager, has family roots in Minnesota and has been a Minnesota sports fan his entire life. "Getting to interface with the team I grew up revering has been something I could never have imagined growing up," says Mulder, who has been in charge of the U.S. Bank Stadium project costing, proposal development and contract execution for Daktronics, a South Dakota-based company that has produced U.S. Bank Stadium's top-notch technological equipment in its newly expanded plant in Redwood Falls, Minn.

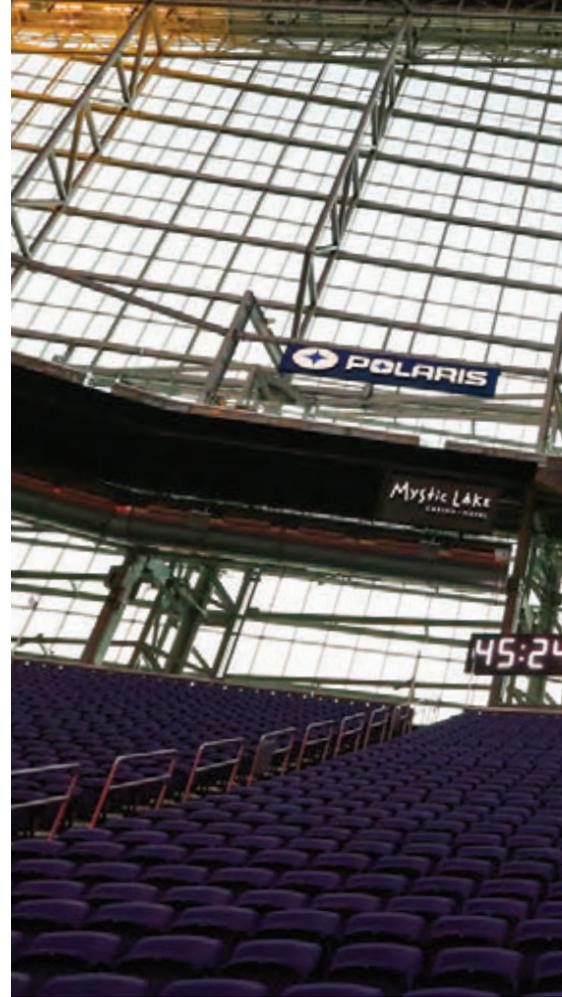
That's not a coincidence. Creating local work was an important point of emphasis for the Minnesota Sports Facilities Authority (MSFA), so when Daktronics pitched its role in the project, it proposed an expansion of its Redwood Falls plant by 30,000 square feet and 100 extra jobs. That helped, but the local angle

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wasn't the only card in the company's hand.

"Daktronics is also the only company that can provide all the relevant pieces: scoring, timing, displays and display control into a truly integrated system," Mulder explains. "Most of our industry competition evolved from manufacturers to brokers, and purchase pieces from multiple companies in order to try to have a complete system. These pieces can include everything from the scoring, display control, video processing and even the LED displays themselves. Daktronics is the only company in the industry that manufacturers all those pieces into a truly integrated system."

There is no shortage of opportunities for visual stimulation at the stadium. Two large videoboards—55 feet high by 95 feet wide and 80 feet high by 120 feet wide—placed above each end zone, are the main attraction for not only Vikings games, but also events. The west board, the larger of the two, measures 8,160 square feet, the 10th largest in an NFL stadium. But the boards' placement at approximately 10 feet above the main concourse, lower and in a superior sightline than a giant center-hung board, is what stands out, so to speak, allowing fans and event attendees a visual sweet spot from just about anywhere without draw-



ing attention too far away from the field. Also contributing to that cause are two levels of ribbon boards that wrap around the stadium, 15 large high-definition video walls and 2,000 4K televisions placed throughout.

"From a meetings standpoint, we had a corporate client in here that has a big annual meeting and they were talking about using the scoreboards for PowerPoints," says David Kingsbury, the stadium's director of IT. "They can be used for graduations or trade shows; we have the technology to support all those kinds of things. The two big scoreboards are actually pretty close to 4K resolution. Those two look awesome."

And don't forget about the two exterior boards on the west side. The 160-foot-long Vikings Legacy Ship features a 2,000-square-foot LED videoboard as its 55-foot-tall sail, and the prow videoboard is even larger at 2,700 square feet.

All these screens are controlled in a state-of-the-art the control room. "I think the video production control room is amazing," says Curtis Schmillen, P.E., the stadium's director of operations. "It can control the scoreboards, ribbon boards and each television in the building with a separate feed. We have the capabili-



BY THE NUMBERS

- 1.7 MILLION WATTS OF LIGHTING
- 2,000 4K TELEVISIONS
- 1,300 WI-FI HOT SPOTS
- 400 WIRELESS 2-WAY COMMUNICATION RADIOS
- 15 LARGE HIGH-DEFINITION VIDEO WALLS
- 4K RESOLUTION IN-HOUSE CAMERAS
- 2 GIANT ENDZONE VIDEOBOARDS
- 2 2,000-PLUS-SQUARE-FOOT EXTERIOR LED DISPLAYS
- 2 APPS: U.S. BANK STADIUM APP AND MINNESOTA VIKINGS APP



ties to run scrolling pictures as a feed to some of the TVs in a club, while using local input to a videoboard for a presentation, at the same time having a company's logo on other TVs to create a highly customizable and interactive experience for guests."

The stadium has an Internet Protocol Television (IPTV) system, meaning each TV can have a unique input and output. "You are not limited to a defined stream of cable or satellite feeds," Schmillen says. "It acts more like a computer monitor that displays the information sent to it. It can be a traditional cable network feed, or it can be a static message board, or it can be part of a presentation. The video control room is the hub of this system and controls and distributes the content throughout the building. Plus it just looks cool with all the monitors and gadgets in the space."

U.S. Bank Stadium brings new meaning to the term *hot spot*. With 1,300 Wi-Fi access points mounted on ceilings, walls and handrails, *scorching hub* is probably more appropriate. The distributed antenna system (DAS) installed by Verizon Wireless is considered carrier neutral, so all four of the major wireless carriers (Verizon, AT&T, Sprint and T-Mobile) have solid connectivity.

"The cell phone coverage and Wi-Fi capacity are amazing in the building and even around the exterior perimeter," Schmillen says. "Many meeting places have pretty good Wi-Fi coverage since most have upgraded their systems over the last few years. But many have poor cell coverage, especially if you get deeper into the building. Or, if they do have good coverage, it is just Verizon or just AT&T because that vendor put their equipment in under an exclusivity agreement with the site. Our system is vendor neutral, so guests will be able to get access to the system no matter what provider they have."

Additional antennas are positioned throughout the stadium for two-way radio communication—about 400 wireless radios are available for event staff.

Feeding off the Wi-Fi will be both a U.S. Bank Stadium app (for events) and Minnesota Vikings app (for games) for Apple iOS and Google Android. They will allow for seamless navigation to the stadium, parking spots and even seats.

Although there's plenty of natural light, thanks to the ETFE roof, there's also 1.7

million watts of sports lighting, ideal for the 4K house cameras in the stadium. U.S. Bank Stadium is the first stadium in the NFL to be built with an advanced LED lighting system (though others have been retrofitted with it), which is estimated to reduce installation loads by 37 percent while using 75 percent less energy than traditional lights.

Whether it's the lights, Wi-Fi or videoboard, there are so many technological innovations within the new stadium that "you could go through it 10 times and still find new things," Mulder says. "There really isn't a stadium that compares today. The most rewarding part personally is going to be taking my family to an event and getting to show what I have been fortunate enough to be a part of." ■

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PHOTOS: MINNESOTA VIKINGS, CASIE BELDO

