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GREEN CONSTRUCTION & CAMPUS ATHLETIC FACILITIES

by David Vinson

If you count your institution among the private universities and colleges that share in the core values of providing the most beautiful, cost-effective, and ecologically friendly amenities possible, you would be wise to take note of what Sustainable Construction practices can do for your on-campus Athletic Facilities.

Sports Venues Minimizing Their Carbon Footprint

But before directing our attention to the on-campus impact of Green Construction, let's first take a more expansive look at what sports venues around the world are doing to minimize their carbon footprint, preserve their green legacy, and take the lead in innovation. Sports venues such as the Amsterdam ArenA, Mercedes-Benz Stadium, Levi's Stadium, and the Golden 1 Center are pioneers in the promotion of sustainability, but perhaps even these do not equal the Allianz Arena of Munich. The Allianz represents what's possible in Green Construction, and it is widely recognized as one of the most spectacular athletic facilities in the world.

Unabashed in its modernity, the Allianz is a high-tech marvel that looks from the outside like an enormous golf ball sliced in half, or perhaps like a mysterious, light-weight airship destined for interstellar travel. It is home to FC Bayern München, the most storied soccer club in Germany and by a wide margin the most globally viable brand of the Bundesliga (the nation's professional soccer association league).

LED Lighting and Vibrant Turf: Turning Sporting Events into Special Memories

The extraterrestrial quality of the stadium is enhanced by a full color changing exterior, an innovation managed by ETFE plastic panels. (Ethylene tetrafluoroethylene is a fluorocarbon-based polymer that, in sheet form, weighs less than 1% of a pane of glass.) Each panel can be independently lit with white, blue, or red light, and cumulatively the exterior allows for an ever-changing canvas.

A few years ago, I approached the Allianz for the first time by way of a bus that I shared with singing Bavarians, Poles, Austrians, and at least a dozen Japanese women, all of whom wore the jerseys of their favorite players. Miles away, as we exited the Autobahn, I spotted through the window of the bus an orb of bright red, the designated color of the home team, as it emanated from the stadium. The red faded to pink at great distances above, blanketing the entire night sky.

Inside the stadium, where the soccer is played, the field of grass was the greenest, brightest, crispest organism I've ever seen. A grass so vibrant and fresh you could almost smell it despite the competing odors of hefeweizen, currywurst, and mustard pretzels, not to mention the chemical flares lit by hundreds of visiting Hamburg supporters in the upper tiers of the stadium.

At kickoff, I was struck by the absence of glare on the field, and at night no less, when I fully expected to squint through my glasses while watching the run of play. I would learn later that the Allianz uses LED Lighting, and for reasons that far exceed glare reduction. A plan for the daytime is also designated, in which built-in roller blinds located at the roof are drawn back and forth to protect match-goers from the sun.

Ranging from its visionary scope to its meticulous execution of that vision, the ambition demonstrated by the Allianz Arena is inspirational. Inside and out, its design represents a seamless forging of aesthetics, local culture, and brand identity—and it manages this in part by prioritizing Green Construction.

A Model for Prioritizing Green Construction

Green Construction represents a vision put into practice, and it signals a unifying effort to design beautiful, healthier buildings that reduce energy and water usage while improving air quality, providing increased daylighting, and eliminating the potential for volatile organic compounds (VOCs) in building products such as furniture, painting, and carpeting. It also incorporates green and sustainable building materials made from renewable resources, which in turn are recyclable at the end of their life.

The Allianz Arena of Munich uses more than 300,000 LED lights, and these obstruct potential glare and also save more than 60% on electricity and some 362 tons of CO2 compared with previous technology based on fluorescent lamps. The structure's versatile exterior of ETFE plastic panels offers extraordinary tear resistance as well as transparency to ultra-violet light. Its high translucency transmits up to 95% of light, thereby providing a full spectrum of natural light.

The pristine playing field of the Allianz is managed by a greenkeeper who uses IoT technology. The technology connects to a "cloud," and this interconnective process gives the grass its own voice. It allows

Cornell University upgraded the lighting system at its Reis Tennis Center with lights that deliver twice the brightness of the previous lighting and use 70% less energy. Lower energy costs save the institution approximately $20,000 per year.

Bayern to make data driven decisions based on a variety of environmental factors, whether light, temperature, humidity, the lawn's salt content, or even the chlorophyll content of the blades of grass. Solar panels have been integrated into the stadium's nearby multi-story car park, and so thorough is the culture of sustainability at FC Bayern that the club has adopted a reusable cup system, thereby alleviating the unneeded waste of hundreds of thousands of disposable plastic cups each year.

Embracing Green Construction for Athletic Facilities

In the fall of 2019, Washington University in St. Louis completed the installation of solar panels at six major locations on campus, among them its Athletic Complex. The new solar arrays have added 1.9 megawatts of solar-generating capacity to university buildings, bringing the total figure to 2.5 megawatts across campus. Erika Ebsworth-Goold notes (see "Solar Expansion Continues at Washington University") that 2.5 megawatts would meet the electricity needs of 394 average U.S. homes. This is the emissions equivalent of taking 480 cars off the road.

Beginning in 2008, the athletics department and the Office of Sustainability at Yale University started Bulldog Sustainability, a student-led program whose objectives are to provide short and long-term suggestions for ecologically minded sports operations. The majority of Bulldog Sustainability initiatives derive from student project proposals, and the students are empowered to research solutions that can have a lasting impact on campus. Since its advent, Bulldog Sustainability has worked towards improving the water efficiency of Yale's field hockey turf and has upgraded the waste management plan for all athletics facilities by adding recycling and composting bins. According to the National Resources Defenses Council (NRDC), 80% of all athletics field waste at Yale is mulched for reuse by turf maintenance.

Bowdoin College built an LEED-certified (Leadership in Energy and Environmental Design) ice hockey arena in 2006, the first of its kind in the United States. Bowdoin also treats its athletic fields almost exclusively with organic fertilizer and has installed high-efficiency light fixtures at its basketball courts, track, and indoor courts. Its culture of sustainability includes an athletic shoe recycling project, one that is managed in conjunction with the charitable organization "Rerun Shoes," which supports micro-entrepreneurs in Liberia, Guinea, and Mali, among other locations in West Africa.

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Cornell University upgraded the lighting system at its Reis Tennis Center with lights that deliver twice the brightness of the previous lighting and use 70% less energy. Lower energy costs save the institution approximately $20,000 per year. As reported by the *Cornell Chronicle*, the old lights of the tennis center took minutes to fully brighten, and they remained lit following evening play. Lanny Joyce, Cornell's newly retired director of Utilities and Energy Management, is quick to remind us that "lighting is the most visible form of energy waste."

The new lights turn on and off quickly and are fitted with occupancy sensors that cover the six indoor courts. Lights automatically shut off following 15 minutes without movement on the court. The shutoff sensors not only save energy but lengthen the lifetime of the bulbs to an estimated seven years as compared with the previous bulbs' two-year life span, a difference that saves Cornell $2000 annually in maintenance costs.

Eco-Friendly Artificial Turf

Prior to its 2019 football season, the University of Richmond replaced the natural grass playing surface of its Robins Stadium with eco-friendly artificial turf. Well-conditioned natural grass may be the standard for player performance and safety, but grass on any athletic playing field rapidly deteriorates, becomes worn, unattractive, and potentially dangerous for student-athletes. Water usage alone for upkeep is a hindrance to the movement of sustainability, as well.

Artificial turf offers what natural grass can in appearance, only it is more durable and cost-effective, and the turf itself can offer shock absorption and safety equal to perfectly maintained natural grass.

The 2019 renovation of the Fred Hardy Track, also located at the University of Richmond, now includes an indoor flooring system with a tunable force reduction layer designed specifically for shock absorption. The track contains a wear layer that repels and resists the scuffing of cleats and pyramid spikes, a measure of its durability and one that also benefits the health of student-athletes by curbing the potential for on-track injuries. The flooring system is GreenGuard Gold certified and ensures superior indoor air quality.

A Healthier, Happier Future

Private universities and colleges across America are using Green (Sustainable) Construction to transform their athletic facilities. The benefits are perhaps most intimately felt by the spectators and the student-athletes themselves, and it is the ongoing interaction between both groups that makes campus athletics so exciting and special.

Green Construction facilitates safer and pristine playing conditions, more natural light, less glare with LED Lighting, and cleaner air. Its implementation on campuses aligns with our core values, and it reinforces our collective efforts to provide for students and the community at large the best possible on-campus experiences.

ABOUT THE AUTHOR: PUPN staff writer Dr. David Vinson has a PhD in English with specializations in transatlantic literature and cultural studies. He is a committed scholar, teacher, husband, and dad. If you ever meet David, avoid the subject of soccer. His fandom borders on the truly obnoxious.

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SKYLIGHTS

Beneficial, Impactful, and Functional

by Mark Mitchell

Natural light can be hugely beneficial when used in educational settings—it improves people's moods, has been shown to improve test scores and focus, and provides a warm and welcoming learning environment.

But while adding daylight to a space may seem like a simple task, the truth is that once you travel 30 to 40 feet inside the perimeter of a building, natural light from traditional windows and curtainwall, even with the assistance of light shelves, rarely provides sufficient illumination for interior spaces. As a result, areas close to the exterior of the building are well lit while interior spaces are left dark and reliant on energy-hungry artificial lighting even during peak daylight hours.

In those types of difficult daylighting situations, the easiest way to bring natural light to otherwise unreachable interior spaces is to incorporate a skylight. They can provide flexibility in design, can be configured with a wide variety of glazing options, and can be strategically placed to offer the highest level of comfort and occupant satisfaction.

Fact and Fiction

Despite their versatility, cost-effectiveness and adaptability, skylights often get a bad rap because of horror stories regarding leaks and poor reliability. The truth is that poorly designed and badly installed skylights can leak—in much the same way that poorly installed roofing materials can leak. Taking the time to investigate both the daylighting manufacturer and the installer can often save a great deal of time, trouble and money.

The devil is also in the details when it comes to making the right daylighting choice. If there's concern over excessive interior humidity (in the case of an aquatic center, for example), or if the skylight will be exposed to wide temperature fluctuations, make certain that the daylighting system includes high-performance sealants and integrated moisture management—namely weep holes and gutters—in the framing system.

This will ensure any moisture on the interior of the system either evaporates away safely or gets redirected to the exterior of the building. If you're unsure that a system features integrated moisture management, check with the daylighting manufacturer. Some systems may leave out integrated moisture management completely, or offer such features at an additional charge.

Another concern that often arises with skylights is weight. Traditional glass skylights are heavy and often require significant structural support. This can affect budgets and schedules in new construction, but can also demand difficult and costly structural reinforcement in retrofit applications. Luckily, lightweight options such as translucent panel systems allow for a more cost-effective solution with many of the same benefits of traditional glass skylights.

In education facilities, skylights are also given a bad rap for causing hot-spots and unbearable glare for students, student-athletes, and faculty. Direct sunlight—while not necessarily a serious problem in transitional areas like hallways where occupants are rapidly moving through—can be an issue for work or office areas filled with computers and other electronics, in addition to areas where people spend extended periods of time, and likewise for sports facilities.

In these areas, translucent glazing material can diffuse the sun's direct rays and limit glare and hot-spots. Mixed glazed systems, such as a combination of translucent panels and glass glazing, can also be effective at providing light control plus ventilation options and views to the sky.

Augmenting Building Design

While window and curtainwall systems are usually highly visible and can provide some unique design elements for a space, skylights can also have that same effect. Because of their versatility, skylights are an elegant and functional way to define and enhance architectural focal points throughout a building's design.

Echoing a geometric pattern from the skylight's framing system in the finished flooring below can create an eye-catching visual effect, and repeating a skylight's shape in ceiling details can help tie daylighting elements to the rest of the space. Color also plays an important role in design consistency. Making creative use of finish colors allows you to easily tie in school colors for a unique and personalized effect. Some daylighting system providers will also custom match finish colors to create a visually stunning daylighting solution, and translucent panel systems can also feature colored insulation to match logo colors or provide a unique stained-glass effect.

Glazing options can also add impact to the overall design. Transparent glazing, for instance, introduces the bright blue of a clear daytime sky and offers the opportunity to bathe surrounding walls or the skylight's framing in intense contrasting colors. Translucent panel systems offer a geometric grid pattern that generally blends well both traditional and modern aesthetics, and the built-in privacy they provide from surrounding buildings can also be beneficial.

Perhaps the most important influence on a skylight's ability to captivate occupants and provide an architectural focal point is its placement within the building. People enjoy having access to natural light during daytime hours, and are drawn to naturally lit locations as they provide a bright, lively, and welcoming place to meet.

When utilized in an area where hallways converge to create a common area, a skylight offers a welcome break from dark, enclosed spaces, and creates a natural gathering area for people to converse. When a space needs a design boost, an ornately structured dome or pyramid skylight becomes a focal point unto itself, encouraging occupants to pause and admire both the skylight and the surrounding architectural elements.

Keep Daylight Within Reach

When looking to add more daylight into a project, new or retrofit, consider the many advantages and overall versatility of incorporating skylights. As an architectural design tool, custom designed skylights are often limited only by imagination (and building codes), and properly designed and installed skylights are a dependable, cost-effective, and beneficial way to utilize energy-saving natural light.

ABOUT THE AUTHOR: Mark Mitchell is the Marketing Director for Major Industries, Inc., a manufacturer of skylights, canopies and translucent wall systems. He can be reached at Major Industries, Inc., 7120 Stewart Ave, Wausau, WI 54401 or by calling 888-759-2678. You can learn more by visiting www.majorskylights.com.

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The Amherst College Science Center won a 2019 AIA COTE® Top Ten Award, the industry's best-known awards program for sustainable design excellence.

Harvard University →

A mix of high-quality materials are used for the Ellison custom balanced doors installed at Harvard University's William James Hall, McKinlock Hall, and the Legal Services Center, including both formed-up bronze and extruded aluminum.

McKinlock Hall (shown at right) was reconfigured to reduce crowding in both common areas and private rooms, improve the flow of traffic throughout the building, and modernize the look and feel of the building's interior. In this spirit of excellence, outfitting these buildings with Ellison Bronze custom balanced doors was the natural choice.

↑ Amherst College Science Center

The award-winning Amherst College Science Center (shown above and bottom right) is a new campus addition replacing the former science building, one that was unable to accommodate today's technologies, equipment, and overall methods for effective teaching and learning. The doors of choice were extruded aluminum balanced doors by Ellison, finished in Amherst College Gray.

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AN OPEN & SHUT CASE

Improving Campus Security One Door at a Time

by Hilary Moreno

This weekend, I had an amazing sleepover with my oldest child in her freshman dorm room. She used her "swipe," as she refers to her student ID card, to unlock the main door to the building, then again to gain entry to the elevator, and finally, to open the door to her room. Dorm room rules meant that I, as a visitor, could not be alone in her room at any time. As a mom, I am secretly elated by all of these overlapping security measures.

When I was an undergrad, there were keypads on most buildings, and each had a unique code. If you didn't know the code, you had to ask a security guard to let you in. I had a key to my dorm room, but found that my meal card was sufficient if I slid it between the door and the door frame. This was convenient, but not at all safe.

Campus-wide Access Control and Card Reader Locks

Keys have existed since the 6th century to keep people and possessions safe, but they may have run their course. New technology allows for much greater control, information, and security when it comes to who is coming and going from buildings on your campus. Current access control options allow for key cards, using either RFID (radio frequency identification) or a magnetic stripe, to be individually programmed for faculty and students, thereby allowing or declining access to specific areas. Key cards can be programmed further to limit access to specific hours.

Each time a student or teacher swipes a key card for entry, information such at that of name, date, and time is collected. This information then can be used to determine campus building usage—for instance, in keeping a library open 24/7 if late night student traffic warrants expanded hours.

When it comes to either the Summer term or Spring Break, admittance to buildings can be restricted through a time-specific reprogramming of access options for students. This effectively limits the need for additional security or staff during breaks, and further, it reduces overall annual expenses.

Key cards can be used in conjunction with pin code access to add o add another layer of security. Unfortunately, in both cases, colleges need to remember that key cards and pin codes can be shared and lost as easily as keys.

Cloud-based Entry Options

For even more flexibility and access control, consider a cloud-based option for entry. A key card, of course, can be damaged, lost, or borrowed; instead of relying on one, students, faculty, and staff can be assigned personalized credentials for various locations through the use of their cell phones or smartwatches. Mobile access also allows for the ability to lock doors remotely so teachers and students can avoid being close to a dangerous situation.

A user database can be easily changed to allow for both an influx of freshmen each year and for the removal of outgoing students, all without the need to collect keys or key cards. Different levels of access can be instantly granted or withdrawn even in the case of campus visitors.

Lockdowns and Other Emergencies

Unlike metal keys that are limited to manual operation, technically advanced entry systems allow entire buildings or sections of campus to be put on lockdown with the touch of a button overriding key cards and pin numbers. With the devastating increase in mass shootings in the recent past, campuses are reconsidering security options that can be accessed and quickly adjusted with cloud-based solutions.

Different types of threats require varying levels of security to have the best chance of keeping students on your campus safe and healthy. In the case of external hazards,

students and faculty may need to be temporarily sequestered inside. If the danger lies inside a building, limiting exit options may help to contain the threat while also allowing safe passage for escaping students. By implementing wired access control systems, the main rule of lockdown--that is, to lock or secure all doors and windows—can be enforced quickly and in turn allow faculty to focus on student safety until the situation is under control. It is important to build in-manual options, particularly in the event of a power failure, or if a student is out of the classroom when lockdown occurs.

Fire Safety Doors

Fire-rated or fire-resistant doors play a significant role in slowing or stopping the spread of flames and smoke. The majority of these doors are constructed of metal, steel, gypsum, glass, or combinations of these materials. Certified fire-rated doors are supposed to not combust from 20-90 minutes when in direct contact with flame; however, this also depends on how hot the fire is and the material and the

material from which the door is constructed. Steel doors can hold off some fires for up to three hours. Although not completely fireproof, these allow time for safe evacuation and for firefighters to contain and extinguish the blaze.

In Addition to Technology

Overlapping security measures allow for the most flexible and secure alternatives when it comes to gaining access to buildings or classrooms. If there's a power failure or if a threat, such as an active shooter, happens too quickly to notify campus security, manual emergency door locks afford immediate security.

Small steel door barricade devices can be permanently installed on either the floor, just inside the door, or near the bottom of a metal door frame, depending on whether it swings inward or outward. Lower placement helps prevent an intruder from breaking a door window to gain access to a room. Portable options are also available and can be quickly installed or removed when needed.

The Right Door for the Job

Doors are not limited to the type I drew as a child on my white-picket-fence home. A residence hall may require a different type of door than a classroom, a science lab, an emergency exit, a gym, or a sports arena.

In some cases, a revolving door or a turnstile may be the best option whereas in others the focus is on maximum security, restricted access, or emergency notification. Additionally, doors should be access-friendly in order to allow for easy entry and exit for people with disabilities.

Many companies offer security options that can be retrofitted to existing doors thereby lessening overall cost for upgrades without compromising the safety of students.

Not Under My Protection Anymore

For 18 years my number one job was to love and protect my oldest child. Now that responsibility lies in the hands of the college she attends. If I think too much about all the possible threats that can lurk on campus, it's absolutely overwhelming. Watching her use her "swipe" to get into any building, elevator, or classroom, I realized her campus had already taken many steps to ensure her safety and that of all the other students and faculty on campus—one of her college's most important jobs.

ABOUT THE AUTHOR: Hilary Moreno is an alum of Birmingham-Southern College. Currently, she is the Creative Director and a staff writer for Flaherty Media.

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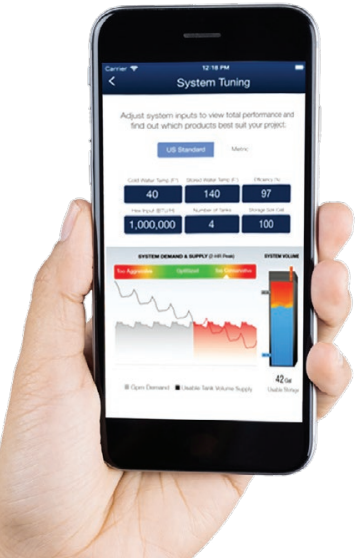

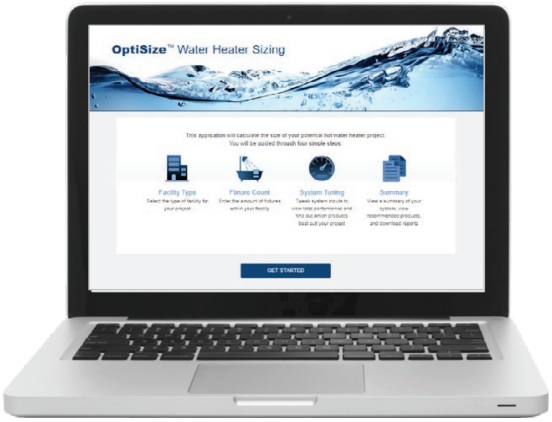

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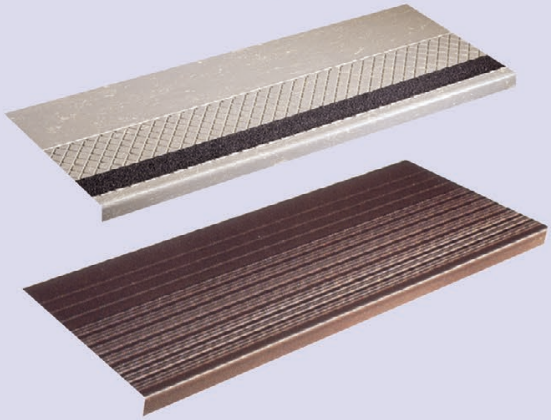

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