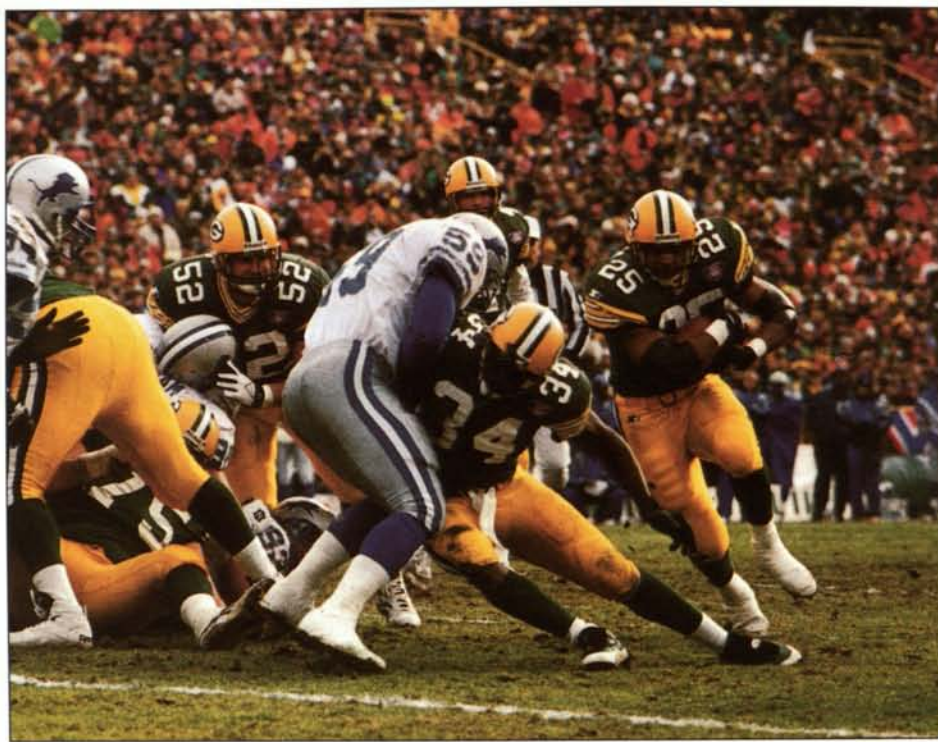




The Invisible Sun:



The electrical heating system underneath the field has survived since the Lombardi era in Green Bay. Photo courtesy: Green Bay Packers.

Heating Soil From Below

By Mike Augsdorfer

Steam rises from the head of a defensive tackle as he takes off his helmet and trots to the sideline. Nearby, the punter shivers beneath the coat thrown over his shoulder. The referee dodges another snowball thrown from the stands. In the offensive huddle, the quarterback's face is shrouded by the frozen cloud formed by his breath as he barks out the snap count. Meanwhile, the barefoot placekicker contemplates the relative merits of frostbite and his high salary. The team lines up for the potential game-winning field goal, gratefully acknowledging that — win or lose — they will soon be back in the locker room taking hot showers to stimulate the circulation in their frozen bodies. The kicker winces, knowing that the football will be rock hard when he kicks it. The ball is snapped, and frozen foot meets frozen ball ...

The grass beneath the players' frozen feet is green — a particularly nice shade of green, considering the frigid conditions. Just a few inches below the frosty scene,

the roots of the turfgrass bask at a comfortable, if not balmy, temperature. How can the roots be toasty warm when the surface temperature is below freezing? The answer is simple: the soil is heated from below by a system designed to keep the roots warm, even when the surface temperature is better suited for ice hockey than football.

Several high-profile athletic facilities in the U.S. utilize soil heating systems to maintain consistent soil temperatures regardless of the weather. At least five NFL teams play home games on fields that feature below-ground soil heating systems. Coors Field in Denver, home of the Colorado Rockies baseball team, also has an underground heating system, and several major colleges utilize underground heating for their football game fields. Some field heating systems operate by pumping hot water through underground pipes to maintain a constant soil temperature. Other systems utilize underground electric wires or cables to heat the soil.

Electrical Heating Systems

When the Minnesota Vikings moved to the climate-controlled Metrodome, Lambeau Field in Green Bay, WI, inherited the reputation of coldest field in the NFL. While the fans and players in Green Bay brave sub-zero temperatures for their late-season games, the turf at Lambeau benefits from an underground heating system that keeps the roots at a comfortable temperature. The electric heating system underneath the field has survived since the Lombardi era in Green Bay. "It's 27 years old," says stadium turf manager Todd Edelbeck. "The last few years we've been to 20-below, but our winters haven't been too bad." Edelbeck admits that the team is exploring the possibility of installing a new hot-water system at the stadium. The current electric system features cables planted approximately six and a half inches below the surface. They run 12 inches apart at the center of the field. "Up until last year we turned it on a week or two before the last game," says Edelbeck.



The football field at Arizona State University, which is also used by the Arizona Cardinals, utilizes an underground heating system to extend the season for the bermudagrass.

"Last year we turned it on when it started getting cold in October, and we were able to keep the frost out until we were done, so it worked much better."

Mark Razum, who supervises the grounds crew at Coors Field in Denver for the Rockies, operates an electric heating system for the baseball field right out of his office. "There are three zones that control the entire field, and I have the control right in my office," says Razum. "Each zone has its own thermostat set eight inches below the surface." Razum keeps the controls set at 58 degrees, but he can override the system with a flip of a switch if he feels the field is getting too much heat or not enough. "I can turn it to manual and go out with a temperature probe if I felt that 58 degrees wasn't enough."

Razum will maintain the soil temperature at 58 degrees for the remainder of the baseball season and through any playoff games the Rockies might play. "After the season I'll set it to 48 or 50, then work the temperature up gradually," he relates. Razum expects to use the system for initial greenup in the spring. Last year he started warming up the field in mid-February to around 50-52 degrees, and with mild temperatures for the pre-season replacement games, he was able to back the system off gradually until it was turned off entirely in late March.

The electric heating system at Coors Field features roughly 45 miles of cable buried beneath the surface. "It has a resis-

tance copper wire in the center and a PVC around it, then a braided wire and a PVC coating," explains Razum. He also must be careful about taking heavy equipment on the field because the electric heating system is sensitive to the weight placed on the field. "It's pretty fragile — any extra weight on the surface can break the wire," says Razum.

Indiana-based Easy Heat, Inc., designed the heating system for Coors Field.

"What we installed was about seven watts per square foot of heating cable six inches below the surface," explains John Zollman, national sales manager for Easy Heat. The company has also worked on heating systems for Busch Stadium in St. Louis, MO, Sullivan Stadium in Foxboro, MA, the Air Force Academy in Colorado Springs and Mile High Stadium



Coors Field in Denver, home of the Colorado Rockies, has 45 miles of underground heating cables installed in the rootzone. Photo courtesy: Randall & Blake, Inc.

in Denver. "It is something that has been proven to work," says Zollman. "It is really designed to fool the grass into believing that it's the growing season." In many cases, sports turf managers can keep turf green and growing even when air temperatures dip to freezing or below by keeping the roots at a constant temperature. "The daylight is a factor," admits Zollman, "but in many cases there is enough daylight to sustain growth."

Hot-Water Systems

Razum's NFL counterpart in Denver is Thomas Lujan, who manages turf maintenance operations at Mile High Stadium for the Denver Broncos. "We used to have electric heat, but now we've installed a water system," says Lujan. "I haven't used it yet," he admits, but with the constantly changing weather conditions in Denver, he can expect to use the system often during the season.

While electric heating systems using wires or cables have been in use for many years, hot-water systems have become popular in recent years. The Chicago Bears do not have a heating system at Soldier Field, but they have experimented with a heating system on one of their practice fields. "We've used it for two years just on the side of the practice field," says Ken Mrock, who maintains the practice fields for the Bears. The hot-water radiant-heat system was installed at eight-, ten- and twelve-inch depths. "We found the ten-inch depth is best because it doesn't affect your cultural practices." The Bears are planning to install a hot-water system at the new 37-acre practice facility they are building in Lake Forest, IL.

Heating systems have been in use for years at cold-weather venues such as Denver, Green Bay and New England, but they can also be used to extend the season for bermudagrass fields at warm-weather venues. Don Follett, manager of stadium grounds at Arizona State University, has developed a unique application for the hot-water heating system at Sun Devil Stadium, which is shared by the Arizona State football team and the Arizona Cardinals of the NFL. "I take steam heat from the campus boilers and store it in a 500-gallon tank in the end zone," he explains. Follett uses heat sensors to determine the temperature of the soil, and when that temperature drops to a certain, predetermined level, the heating system is automatically activated. "I usually keep it right around 72 degrees," says Follett. The German-designed system was installed approximately seven inches below the surface of the field at Sun Devil Stadium.

BioTherm Hydronic Inc. of Petaluma, CA, has developed a soil-temperature control system called TurfTemp that has been installed at several golf courses, including

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Palos Verdes Country Club near Los Angeles and Pebble Beach Golf Links, to combat problems with soil temperatures on sensitive greens. Jim Rearden, president of BioTherm Hydronic, Inc., says the trend is spreading toward athletic fields. "We actually have proposals out to several athletic fields," he relates.

"It's done in Europe all the time." Rearden admits that the company markets heavily toward golf courses, but he sees plenty of room for expansion into the sports-turf market.

Drawbacks of Heating Systems

Not all soil-temperature control systems are unqualified success stories. George Toma, the NFL's leading turf expert, has worked on several fields

with heating systems and says he's seen his share of problems. "I haven't seen one that really worked well," he notes. Toma specifically recalls problems with the underground heating system at RFK Stadium in Washington, DC, when he was preparing that field for an NFL playoff game several years ago. "At RFK when the system worked, the field was muddy, and when it didn't work, it was frozen," says Toma.

Tony Burnett, head groundskeeper at RFK Stadium, admits that the heating system doesn't get much use because Washington lies in the transition zone and doesn't usually get that cold until after the end of the season. "It's a luxury to have, but we barely use it," says Burnett. He notes that maintenance of the system is very expensive and claims that he can achieve good results from the turf by simply practicing sound turf-management techniques.

Few sports turf managers below the professional level are likely to have the financial resources needed to install sophisticated soil-heating systems to keep their turf green and healthy through the cold winter. Sometimes a little creativity can go a long way, though. Just ask Vince Patterozzi, head groundskeeper for the Cleveland Browns. Patterozzi doesn't have a soil-heating system at Municipal Stadium in Cleveland, but he makes use of the resources at his disposal. "We blow propane-fueled heat into our drainage system," he explains. "That's somewhat successful, but not to the extent that [the systems at] Mile High or Coors Field have been." Patterozzi urges sports turf managers to use common sense and to be cautious if they try to implement this idea or something similar at their facilities. For example, blowing hot air through a plastic pipe system is not practical and may damage the system.

Solid sports-turf-management techniques are still the best method for keeping turf green and growing as long as possible. However, soil-heating systems are a useful tool for those that can afford them. These systems can be used to promote turf growth and green color well into the coldest months of the year. □

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