Researchers see golf applications for subsurface drip irrigation

By PETER BLAIS

Subsurface drip irrigation of greens and tees could be the wave of the future, according to companies and researchers involved in the cutting edge technology.

"By the year 2000, water is going to be **the** major environmental issue for golf courses," predicted Karen Ferguson, vice president of Sausalito, Calif.-based Geoflow Inc., which has been in the drip irrigation business for 20 years. "Golf is an expensive business to get into. But in the next two years, we plan to go after it hard."

Geoflow is busily testing its subsurface grid of 1/2-inch drip line on turf plots in California, Texas and Hawaii. It has been installed on a green at Point Grey Golf Course in Vancouver, Canada, and tees at the Mid-Ocean Club in Bermuda. Canyon Crest Country Club in Riverside, Calif., plans to install the system on a green sometime in the near future, according to superintendent Michael Rohwer. Netafim Irrigation Inc. of Fresno, Calif., recently installed its Techline subsurface drip system along a steep bunker face at the Country Club of Rochester (N.Y.), according to Regional Sales Manager Mike Stoll.

"The water from sprinklers was passing through the bunker and splashing sand on the faces," Stoll said. "We installed the system along with a moisture-sensing probe that checks moisture levels every 20 minutes and opens the water valve as needed. The goal is to not have to aim the sprin-

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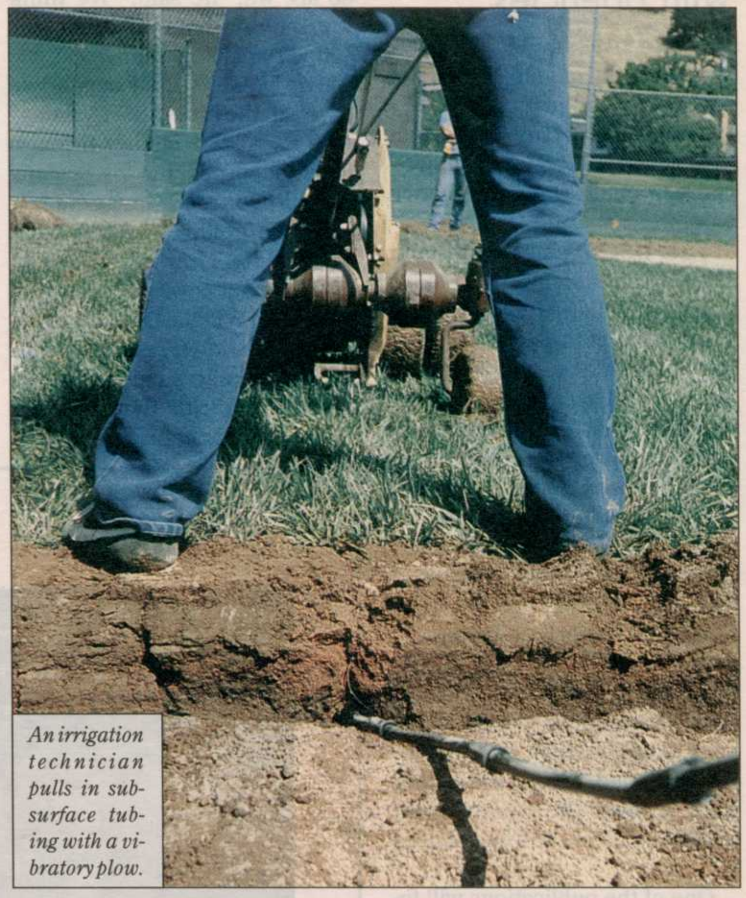
Research conducted on this plot at the Center for Irrigation Technology at California State University in Fresno, Calif., points to numerous golf course applications for subsurface irrigation.



An irrigation technician pulls in subsurface tubing with a vibratory plow.

SyncroFlo ships 1,000th third-party tested unit

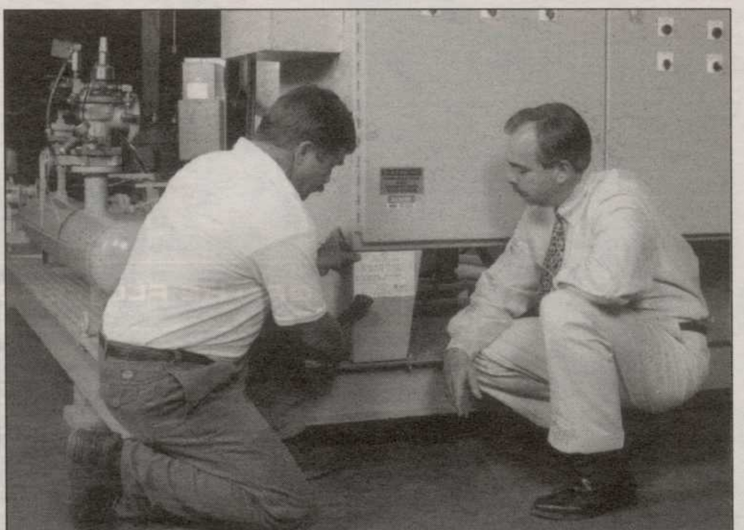
NORCROSS, Ga. — SyncroFlo has marked its 1,000th pump station to be shipped with third-party certification.

Third-party system certification is required by OSHA regulations. Compliance with these regulations lowers owner liability because operating and maintenance personnel are less likely to be injured since all safety and environmental protections are included. Course designers, specifiers and contractors are also protected by third-party certification should any job site accidents attempt to place liability elsewhere.

SyncroFlo first signed on to have its pump stations third party listed in October 1992. Since then, more than 1,000 pump stations have been produced under this certification.

Specifically, SyncroFlo system components are regularly evaluated by ETL to meet the following internationally accepted standards: ANSI/UL-778 water pumps; ANSI/UL-1004 electric motors; ANSI/UL-508 electric industrial control equipment; ANSI/ASME B73.1M-1990 and ANSI/ASME B73.2M-1990 horizontal-end suction or vertical inline centrifugal pumps for chemical process; ANSI/SAE J745-APR87 hydraulic-power pump test procedure; ASTM F336, vol. 09.02 gaskets for severe corrosive service; and ASTM G74, vol. 14.2 dynamic-pressure testing of O-rings.

For more information, contact SyncroFlo's David Thrailkill at 800-886-4443.



Bob Clark, SyncroFlo field service technician (left), applies the third-party certification plaque, as SyncroFlo golf sales manager David Thrailkill looks on.

MARKET BRIEFS

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GLENDORA, Calif. — Rain Bird's Golf Division recently announced winners of The Freedom System Giveaway Contest. The Freedom System is engineered to give golf course superintendents direct access and control over irrigation operations through a convenient hand-held radio.

The six winners are:

- Manuel Delgado, Crystaline Country Club (Liano, Calif.)
- Robert K. Ellis, Indian River Club (Vero Beach, Fla.)
- Doug Falk, Indian Springs Golf Course (Litchfield, Mo.)
- Howard Hamaoa, Pearl Country Club (Aiea, Hawaii)
- Larry C. Hantle, Country

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Matching your course with the right pumping station

By DAVID B. BECK

A properly designed pump station responds to the water demands of an irrigation system with little hesitation and minimal fluctuation in pressure and power consumption.

Every golf course is unique in its pump station requirements. Site factors like elevation changes, the location and elevation of the water source relative to the pump station and total irrigated area shape the individuality of pumping systems. Down the line, the number and type of sprinkler heads, as well as variations in pipe type, sizing and routing help to more precisely define pumping needs. Finally, the way the individual irrigation systems are operated from course to course and season to season clarify site-specific pumping requirements.

When sizing a pump station, all operational and system characteristics must be analyzed and coordinated to calculate a maximum expected flow rate and total pressure requirement. Pump stations should meet, but not significantly exceed, the capacity needs of the course. Excess flow capacity is money spent on horsepower that's never used, while the pump station consumes more power than is actually required. This excess pressure also unnecessarily stresses other system components and can lead to failures later.

Sizing for Pressure

Excessive pressure in piping can be as much a problem as inadequate pressure. High pressure, usually the result of a pump station elevated above the rest of the irrigation system, can exceed pipe, valve and sprinkler pressure capacities and create a hazard with quick-coupler connections at lower points on the course.

Position and pressure requirements of all turf heads on the course are needed to determine output from the pump station. It takes energy to move water uphill, and additional pressure must be provided for irrigation water to reach the highest locations on a course. Under static conditions, every 2.31-foot change in elevation equals 1 psi in pressure. If the mainline goes up 2.31 feet, pressure goes down 1 psi. If the main goes down 2.31 feet, pressure's up 1 psi. In extreme

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David B. Beck is a professional engineer and the president of David B. Beck & Associates, Inc., a golf course irrigation design firm in Ann Arbor, Mich. Article courtesy of the Irrigation Association, Fairfax, Va.

Pumping choices

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elevation-relief situations, pressure-reducing stations or separate pump stations altogether may be required.

Distances from a pump station to the furthest head on the course can exceed two miles. As water flows through piping, energy is consumed and a pressure drop results. Barring elevation, the longer the distance, the higher the pump station pressure required.

Mainline pipe sizing and composition impact pressure requirements. More energy and pressure will be needed at the pump station to provide a 4-inch main with an equal amount of water flow as a 12-inch main. Pipe material also plays a role, as the inside of steel pipe is rougher than PVC and requires more energy to transport water.

Sizing for Flow

Just as many factors are involved in sizing for pump station flow rates. Flow-rate sizing starts with the irrigation schedule. To minimize water-flow requirements, an irrigation schedule must be balanced within the watering window. As watering windows close, higher-capacity systems are needed. An eight-hour window requiring 1,000 gallon-per-minute (GPM) flow may become a six-hour window that requires 1,500 GPM.

The superintendent should formulate irrigation schedules that maintain a relatively consistent pump-station flow rate throughout the irrigation period. It's better to schedule each irrigation set over the entire site, like all odd greens or even fairways. Irrigating over the entire course at any given time will minimize excess velocities in the pipe network and help reduce pressure requirements at the pump station.

Models

The most effective way to evaluate pump-station performance is to build a computer model of the station and irrigation system. These computer models map every irrigation pipe, valve and head on the course as well as other factors influencing pressure and flow rates. They also help maximize efficiency by properly sizing the station according to flow and pressure, thus minimizing up-front equipment expense and ensuring that capacity meets the needs of the irrigation system with little excess.

Flow needs on a golf course can range from 1 or 2 GPM to several thousand GPM. Typically, multiple pumps are sized to meet all irrigation needs, from hand watering to a full irrigation program. Pump stations and their control systems can be customized to accommodate the needs of the course and operational preferences of the superintendent.

Sizing for Budgets

An entire book can be written on variable frequency drive (VFD) versus constant-speed pump stations, and the benefits and drawbacks of each.

Generally, variable frequency drives change the speed at which the pump turns. By changing the speed of the pump, pressure remains uniform over a wide range of flow rates. The pump can turn slow enough to provide the volume of water required for operating one head and then accelerate as needed for additional heads to operate.

Variable frequency drives don't require elaborate control valves to regulate pressure, thus saving power needed to push water through these valves. Also, less energy is wasted spinning the pump at unnecessary speeds.

Smooth transitions in flow changes add to the value of VFDs. As heads and valves open and close, the speed of the motor adjusts, similar to an accelerating or decelerating automobile engine.

The primary disadvantage of a VFD station is cost. This higher expense must be offset by lower system operation and maintenance costs. All golf course pumping requirements are different, and in many cases operational savings won't justify the additional cost of a VFD station.

Constant-speed pump stations are pumps with motors that are either on or off. The primary advantage of constant-speed pump stations is the lower initial cost. Disadvantages include higher energy costs and rougher transition of flows.

If you have expensive power and high water requirements, a VFD might be more attractive. If power costs and water demands are low, constant-speed stations might be more appropriate.

Irrigation engineers and consultants can objectively analyze system components and operation, and assist in the construction of computer models to properly size pump stations. As the professionalism of consultants has emerged, so has that of prefabricated pump-station manufacturers. They offer extensive and invaluable service networks to provide emergency repairs and service. Companies that deal predominantly in golf course pump stations know the gravity of downtime associated with pump equipment failures.

Pump stations should be precisely engineered to fit site-specific conditions and budget maximize resources while significantly extending the life of the irrigation system. The more superintendents understand about the topography and irrigation demands of their courses, the clearer pumping requirements become.