DOC'S DUGOUT - An Inning From Our Past -

Dr. William H. Daniel - A Man with Ideas Ahead of His Time - Part III

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Historically, the concept of the PAT System came in December of 1970 when Dr. Daniel watched a muddy football game being played in Oakland, California. In spite of the fact the field had internal drains under a sandy soil, excess surface water was still a problem. The questions were obvious - How can excess water be vertically removed from athletic fields?

This question was also being asked by those maintaining artificial turf because of the wet and slippery conditions associated with those surfaces during or after a heavy rain. Daniel's research began to find answers to these problems. In one laboratory experiment it was discovered that 6 minutes of suction on the root-zone was equal to 6 hours of natural drainage. The work continued with the first PAT field installed in the early 1970's on the football field at Goshen High School in Indiana. The technology developed at Purdue resulted in the design and installation of vacuum or suction pumps that are connected to the main drain lines, which moved water off the playing surface.

The PAT system controls the moisture content on its surface by using suction pumps to extract water from the field surface thus keeping the field firm. The two suction pumps are capable of removing 25,000 gallons of water from the field per hour (approximately 1 inch of rain per hour). The PAT field is flat since there is no need to construct a crown to remove excess surface water. The extensive drainage system located on the top of the plastic barrier and underneath the sand removes all excess water once the pumps are activated.

The Components of Early PAT Athletic Fields

Fields were excavated to a depth of 16 inches. This procedure normally took about 10 days to complete and required the removal of approximately 4500 cubic yards of soil.

Four-millimeter plastic sheeting was installed on the bottom and sides of the excavation. This plastic liner extended to the surface and around the entire perimeter of the field and acted as a water barrier by allowing the excess moisture to be drained away or stored.

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A series of two-inch and four-inch pipes were placed directly on top of the plastic liner. The two-inch pipes were laced with tiny slits and placed along the length of the field every 15 feet. The slits in the pipe were smaller than the size of the sand used in the root-zone. The entire drainage system was connected to one or two (in later versions) six inch line(s) which were attached to a series of valves that allowed the removal of water either by gravity or by the use of the pumps. The pumps were located in a pit off the playing field. Early versions of the system utilized two vacuum pumps to remove water while some of the later field installations had three pumps. Over 7000 linear feet of drainage pipe was used.

When the drainage pipes were in place, approximately 5,000 tons of specially selected medium-fine sand was placed over the pipe and liner. Sand selection is critical to the effectiveness of the root-zone. The sand must remain firm enough to withstand rugged play yet provide optimum conditions for good turf growth.

Over one mile of electric heating cable wire was buried beneath the field. The heating cable provides a dense, firm field for use while other fields are frozen. The heating system forced the grass to continue to grow until the end of the season.

The fields were then sodded with the proper grass for the climate.

The above are examples of some of the early PAT system components that were installed in the 1970's and 1980's. Moisture sensing, stronger plastic liners, more sophisticated drainage pipes, better irrigation systems, cleaner and better-sized sands and reinforcing fibers are used today in the later versions of the PAT system. In 1982 Dr. Daniel sold the business rights to PAT to Laurel Meade of Pueblo, Colorado and served as consultant to the program. The Motz Group located in Cincinnati, Ohio purchased all rights to the PAT system in 1994 and continues to install quality sports fields to this day.