

Having Your Morning Coffee Without Donuts

Custom sprinkler nozzles can improve irrigation distribution uniformity.

by MIKE HUCK

IN AN ARID CLIMATE, like that in Southern California, the inefficiencies of poor irrigation coverage are quick to surface. Occasionally, repetitive patterns such as donuts indicate to the turf manager that the problem is not related to soil or compaction, but is mechanical in nature. The condition is usually caused by poor distribution uniformity from the sprinkler nozzles.

This was exactly the situation that golf course superintendent John Martinez found himself facing at the Southern California Golf Association's Members Club in Murrieta, California. Throughout the property there were donuts along with unmanageable wet and dry

areas. The problem was so bad that it affected germination of overseeded perennial ryegrass each season. The donuts only disappeared after substantial rainfall.

Originally, the entire sprinkler system was scheduled for replacement as part of a course expansion from 18 to 27 holes. When remodeling plans were delayed for an indefinite period, it was decided to investigate nozzle replacement to improve efficiency. The first step was a laboratory evaluation of the size of each factory replacement nozzle at the Center for Irrigation Technology (CIT), at Fresno State University, Fresno, California. CIT has the

capability of testing a single sprinkler and projecting the uniformity of coverage at any selected spacing with a computer software program. Each available factory nozzle was tested based on *in-field spacings* of 88-foot equilateral triangles, a distance nearly 30% greater than normally specified for desert climates. Each test revealed a donut pattern around the head. The results were discouraging and it appeared that there was little hope for improving the existing system.

Then John discovered Full Coverage Irrigation (FCI), Incorporated, of Coarsegold, California. FCI had been manufacturing custom *high unifor-*

Donuts are caused by poor distribution of water near the sprinkler head.





The secret of the FCI nozzle is the patented stainless steel insert's notches.



The patented insert's notches strip a small amount of water from the main stream, placing it close to the sprinkler head, without affecting the distance water is thrown.

mity sprinkler irrigation nozzles for agriculture since 1980 and was now developing nozzles for a number of popular turf sprinklers. John learned the theory behind the FCI nozzle after contacting David Malcolm at FCI.

The FCI nozzle is machined from brass and contains plastic stream-straightening vanes. This creates a stream that does not distort and throws water a great distance, much like a fire hose nozzle. There is also a patented stainless steel insert with three tiny notches pressed into the nozzle's face. Each notch strips a small amount of water away from the main stream, depositing it in close proximity to the sprinkler head. This combination develops a very desirable wedge-shaped profile. When a wedge-shaped profile is overlapped on a triangular configuration, it produces the most uniform distribution of water possible — next to rain, that is.

The cost to retrofit all 1,500 sprinklers was estimated at \$20,000, a reasonable figure when compared to the \$1 million estimated for system replacement. To further warrant this investment, additional tests were performed at CIT with a sprinkler equipped with FCI nozzles. The projected data were remarkable; when based on the driest 5% area of the pattern (a 329-square-foot area), the Scheduling Coefficient (run time multiplier) improved 20%. When based upon the driest 1% of the pattern (a 59-square-foot area), there was a 50% improvement.

Keeping in mind the old adage "It looks good on paper, but will it work in the field?" a worst-case scenario field evaluation was performed. The fourth fairway was retrofitted with the custom nozzles and after one week results were obvious. The normally wet areas dried up, while dry spots and donuts disappeared. John said that he could not believe his eyes.

So, if you have a hydraulically sound design with uniformly spaced heads, these nozzles present an alternative to complete system replacement. For more information on FCI's nozzles, contact David Malcolm, Full Coverage Irrigation, P.O. Box 1540, Coarsegold, California 93614, (209) 683-3072.

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