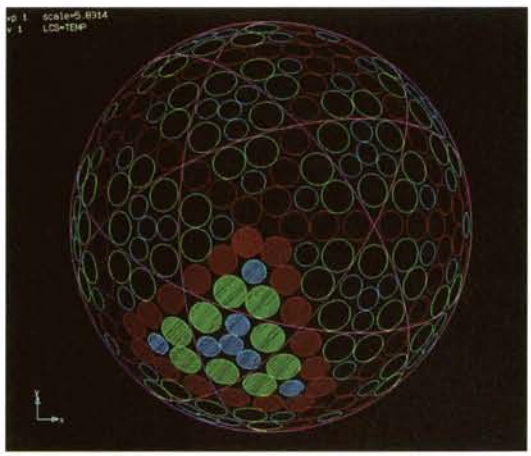
GOLF AERODYNAMICS

The Ultra® 500 Series golf ball **(right),** introduced in 1995 by Wilson Sporting Goods Company, Humboldt, Tennessee, has 500 dimples arranged in a pattern of 60 spherical triangles. That probably has little meaning unless you are a golf pro or a low handicap amateur, but the design represents a major departure from Wilson's traditional ball-design approach. It is a design that employs NASA aerodynamics technology to create what Wilson Golf calls "the most symmetrical ball surface available, sustaining initial velocity longer and producing the most stable ball flight for unmatched accuracy and distance."



Seeking to optimize both distance and accuracy, Wilson Golf assigned a design engineer formerly associated with NASA programs to conduct extensive research and testing on dimple patterns. The result of his work was a ball that has 60 triangular faces, compared with about 20 in earlier Wilson balls; the triangles are formed by a series of intersecting "parting" lines to balance the asymmetry caused by the true molding parting line in all golf balls **(left).**

Every Ultra 500 ball has dimples of three different sizes, shapes and depths, each dimple mathematically positioned for best effect. The selection of dimples and their placement optimizes the interaction between opposing aerodynamic forces of lift and drag. Large dimples reduce air drag, enhance lift and maintain spin for distance. Small dimples prevent excessive lift that would destabilize ball flight to a degree. Medium sized dimples blend the characteristics of small and large dimples. The overall result, says Wilson, is a more uniform airflow over the spinning golf ball surface.

The research program that led to the patent-pending dimple pattern was conducted by Robert T. "Bob" Thurman, principal engineer, aerodynamics for Wilson Golf. Thurman's initial aerodynamic experience was acquired when he served in the Loads and Dynamics Group of Martin Marietta Manned Space Systems, New Orleans, Louisiana, manufacturer of the Space Shuttle's External Tank. Says Thurman:

"My responsibilities (at Wilson) include the design of dimple patterns for purposes related to the aerodynamic performance of golf balls, as well as analysis of trajectories and club/ball impact performance. In a way, my job is very similar to that at Martin Marietta. Instead of analyzing airloads on the Shuttle, I analyze airloads on airborne golf balls and the effects they have on the ball's trajectory, shape and distance. Instead of analyzing the slosh damping capability of the Shuttle's liquid oxygen tank, I analyze the effects of varying moments of inertia on the spin decay of a golf ball due to its liquid center."

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