

WORKING KNOWLEDGE

GOLF BALLS

Flight Control

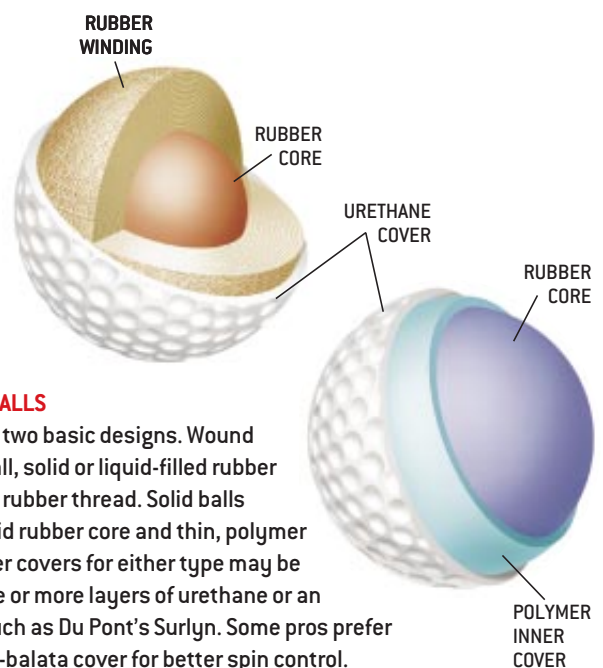
The quest to engineer a golf ball that flies long and true dates back to 15th-century Scotland. Artisans there tediously stuffed a wet leather pouch with a hat-full of boiled goose feathers, then stitched it shut. The drying feathers expanded while the leather shrank, to form a ball as hard as a rock. A skilled ball maker could produce only four featheries a day, relegating the game of links to the rich.

Four hundred years later, in the 1840s, the guttie arrived. Craftsmen heated and molded gutta-percha gum (which was, and is, used in dentistry) from the Malaysian *Palaquium* tree into a solid sphere. Durable and inexpensive, the guttie brought golf to the masses. Golfers noticed, however, that new, smooth gutties did not fly as straight or as far as old, nicked ones. Ball makers began cutting, hammering or impressing various patterns of indentations into each ball's surface, a practice that helped balls fly straighter and longer. Because the science of aerodynamics was still young, no one really knew why.

In 1898 Ohio golfer Coburn Haskell and B. F. Goodrich employee Bertram Work unveiled a rubber golf ball. They wound rubber thread around a solid rubber core. Soon the balls were coated with balata, a strong, water-resistant latex from the tropical billy tree. In 1908 English engineer William Taylor received a patent for an inverted bramble pattern of evenly distributed circular depressions imposed on the ball's surface; these dimples reduced aerodynamic drag and enhanced lift.

By 1930 British and American golf associations had standardized the diameter and weight of balls for tournament play. Manufacturers have tried all manner of dimple patterns since then. Today most balls sport around 400 dimples. Lately makers have been experimenting with two-tiered dimples in hopes of further reducing drag.

Some golfers complain that better technology gives players too much aid. It does help duffers, but it hasn't diminished the skill pros require. Wally Uihlein, CEO of Acushnet, maker of the Titleist brand, notes that "in spite of space-age balls and clubs, the average score on the PGA Tour has improved but one stroke over the past 17 years." —Mark Fischetti



MOST MODERN BALLS

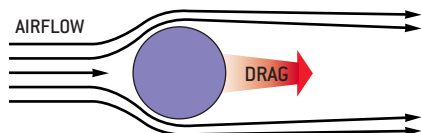
are variations of two basic designs. Wound balls have a small, solid or liquid-filled rubber core wound with rubber thread. Solid balls have a large, solid rubber core and thin, polymer inner cover. Outer covers for either type may be composed of one or more layers of urethane or an ionomer resin such as Du Pont's Surlyn. Some pros prefer a soft, synthetic-balata cover for better spin control.

DID YOU KNOW

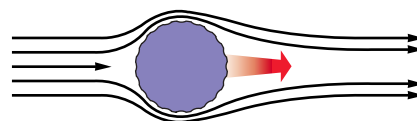
- **DIMPLE WARS** In 1983 Titleist introduced the 384 Tour ball with 60 extra dimples. Golfers said it went farther. Competitors responded by advertising balls with “more dimples for more distance.” But if this argument were taken to its extreme, thousands of tiny dimples would re-create a smooth ball, which tests show travels only half as far as a dimpled one. A ball with 300 to 500 dimples works best, according to Steve Aoyama, principal scientist at Titleist.
- **GOT YOUR NUMBER** Manufacturers paint different digits on balls purely to help golfers in a party tell whose ball is whose. The numbers have nothing to do with ball quality or

characteristics. Nevertheless, golfers will swear that they hit a Top-Flite 2 longer than a 5 or that a Maxfli 1 hooks less than a 6. Superstition? In golf? Never.

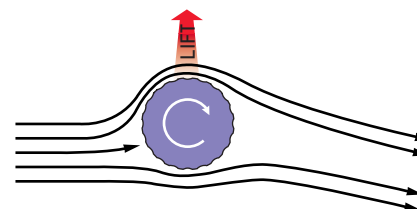
➤ **SMASH TEST** Hye Precision Products in Perry, Ga., tests the durability of newly minted golf balls’ cores, paint, even logos in a closed, squat, 2,500-pound machine. The beast’s air cannon fires 12 balls a minute at up to 300 feet a second across a five-foot chamber into a hardened steel plate. The same set of balls is continually and automatically collected, reloaded, refired, and inspected for deformation and surface condition.



DRAG on a smooth, soaring golf ball is created by the difference between high air pressure against the front of the ball and low pressure behind it, the latter caused by the laminar separation of airflow.



DIMPLES cause turbulence in the thin layer of air against the ball, which reduces airflow separation, creating more back pressure and thereby reducing drag.



BACKSPIN, imparted by the angle of a golf club’s head, deflects airflow downward just as an angled airplane wing does. The resulting upward reacting force gives the ball lift.



Rubber (1898)



Brambled guttie (1890s)



Featherie (late 1400s)



ILLUSTRATIONS BY GEORGE RETSECK; MICHAEL NEVEUX Corbis (rubber/resin); LEO M. KELLY, JR. The Old Chicago Golf Shop (rubber, guttie, featherie); AERODYNAMICS SOURCE: STEVE AOYAMA Titleist