HOW BOEING USED AIRPLANE AERODYNAMICS TO BUILD A BETTER GOLF CLUB

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?Callaway Golf asked the aviation giant to use its knowledge of air flow to take a swing at improving the driver.?

Here's a fact for the next time you need to win a bar bet: How fast does a professional golfer swing the club on a fairway drive? The answer, according to Callaway Golf, is a blistering 120 mph.

With golf club head speeds well into triple digits, aerodynamics is a discipline Callaway has studied for years. For its latest driver, the XR16, the company sought a fresh approach to moving through the air. So they called Boeing, which knows aerodynamics pretty well and surely counts a few golfers among its legions.

"The objective," says Evan Gibbs, Callaway's research and development chief, "was to have Boeing come in and critique Callaway's analytical methods and results, assess our baseline aerodynamic performance to date, evaluate different flow tripping options, and ultimately provide some guidelines for a new design feature on the crown of our upcoming XR16 driver."

In so many words, Callaway wanted Boeing to improve the aerodynamics of its driver. So Boeing brought in its experts to study the aerodynamics, flow physics, and applied computational fluid dynamics of the flow around the club head. "It showed the potential for reducing drag by tripping the flow from laminar to turbulent over the club upper surface," says Jeffrey Crouch, senior technical fellow of flight sciences at Boeing.

Here's what that means: During a swing, a driver experiences two different sorts of airflow across

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the head. There's laminar flow, the consistent airflow across the surface that leaves a smooth wake, and turbulent flow, which leaves a rough, disturbed wake. While turbulence is bad for an airplane wing, it's desirable for a driver head, Crouch says. Turbulent air sticks to the head, minimizing drag. Less drag yields a higher swing speed. Faster swings translate into more force and a golf ball that travels further.

To generate this turbulent flow, Boeing advised putting shaped grooves on the crown of the club to change the airflow from laminar to turbulent at just the right point of the swing. The process is called "tripping the flow" and the grooves are called trip steps.

The average driving distance for golfers on the PGA Tour is 287.7 yards, but Callaway is confident the XR16 will meet and potentially exceed that average. The XR16's greater length, higher moment of inertia, and favorable draw bias should generate more consistent shots, Callaway claims, especially for amateur golfers.

The pros are already putting the XR-16 to use. The club debuted at the season's first PGA Tour event in Hawaii, and Callaway-sponsored Tour players such as Mark Leishman and Danny Lee are swinging the new XR16 driver. Look for the club when the PGA begins its West Coast swing this week says Callaway's Evan Gibbs.

The XR16 Driver will be available at retailers nationwide starting January 29. Prices range from $230 for the fairway wood to $400 for the XR16 Pro driver. Callaway and Boeing say there will be some cross-branding, but didn't offer specifics. Our suggestion: A golf-themed airliner where you can practice your putting in the sky.

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