



THE NEW STANDARD FOR WEDGE PERFORMANCE

A Challenge from a Legend

In 2016, Callaway's Chief Wedge Designer Roger Cleveland approached our Advanced Research Team with a challenge: maximize spin. He asked the team to look at everything: the groove-cutting process, groove-depth, spacing, surface roughness and even inspection. Roger asked, "Are we maximizing all aspects of the spin equation?" The Team got busy finding out.

"Finding the answers helped us generate fresh ideas to help us break new ground in the wedge category," said Cleveland, "allowing us to elevate the performance of our new Mack Daddy 4 wedge to a level we've never reached."

The Science of Spin

Cutting grooves requires tremendous precision in pursuit of aerospace-grade tolerances. Typical steps include fly-cutting the face, cutting the grooves and applying some form of surface roughness to the flat part of the face between the grooves. The Advanced Research Team scrutinized each of these elements closely in search of ways to improve them. A great deal of discussion and debate led the group to agree that the process of rendering a groove could be more precise and consistent from one end of the groove to the other, and from one groove to another.



That led them to develop a new, proprietary saw-cutter only Callaway has, with eight saw-blades oriented to mill the groove horizontally for a tremendously precise process. The wall-angle of each groove was increased to an ultra-sharp 5° in wedges 54° loft and above (20° in pitching and gap wedges). The 5° angle promotes more spin and control, especially out of the rough, in wet conditions, and around the green.

The saw-cutter is replaced after every 15 clubheads to ensure every groove is cut with maximum precision. "The degree of care and attention that goes into the cutting process has a clear impact on performance," said Cleveland.

An additional groove, called the "Nip-it Groove," was added at the very bottom of the face. It's especially useful for keeping the spin-rate up on shots hit low on the face.

Groove-in-Groove™ Technology

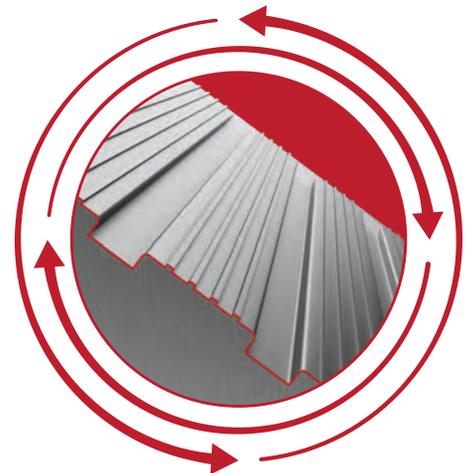
Callaway has in the past applied texture to a wedge's face using a laser. Though it initially promotes more spin, the texture lacked durability and wore down quickly.

The Team explored new textures and new ways to apply them that would result in real and lasting spin benefits. Approximately two dozen micro-texture configurations were tested, including micro-negative, with the texture depressed into the surface, and micro-positive, with a raised texture. Even different blast media were pursued as a method of activating the surface roughness of the club.

"We arrived at Callaway's new 'Groove-in-Groove' technology in which two micro-positive ridges are applied to the flat parts of the face, parallel to the grooves," said Cleveland. "The ridges form a micro-groove between them, which is why we named it Groove-in-Groove."

Groove-in-Groove technology and the Nip-it Groove gives the MD4 84 potential points of contact to interact with the ball.

"The more potential points of contact you have, the greater the friction between the cover and clubface, which is what generates spin," said Cleveland. "Elevating the MD4's number of contact points to 84 should help any golfer get more spin and control on full and partial shots, whether you're a Tour pro or 25-handicapper."





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100% Inspection Process

Every MD4 groove is 100% inspected with a digital stylus and special software to assure the tightest tolerance within USGA rules. That's a first for Callaway, and the final piece to the puzzle that helps MD4 wedges achieve the high standard of wedge performance for which they are designed to deliver

A New Standard for Wedge Performance

Roger Cleveland and the Advanced Research Team worked together to leave no stone unturned in their quest to make the new Mack Daddy 4 wedge the highest performing wedge. In a long and storied career devoted to the advancement of wedge design, Cleveland calls MD4 his greatest work.

"The combined experience, brainpower and energy that went into questioning the status quo and developing a new production process, more precise groove architecture and our Groove-in-Groove technology has led to a superior wedge that promotes superior performance," said Cleveland. "We're extremely proud of it."

