USGA
Green Section
RESEARCH YOU SHOULD KNOW
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DO GOLF SHOE DESIGNS AFFECT THE PUTTING GREEN?

BY USGA GREEN SECTION

- Researchers evaluated surface disruption tendencies from more than 20 golf shoe outsole designs over two years at multiple locations.
- Putting green management practices were evaluated to determine their impact on the visibility of foot traffic and putting green smoothness.
- Traffic from older designs, including metal spikes, was more visible than the most abrasive outsole materials and cleats currently on the market.
- In general, less traffic was visible as the number of studs, cleats or cleat prongs on shoes increased.
- An appropriate and frequent sand topdressing program can minimize the visibility of foot traffic.

Foot traffic can reduce putting green smoothness. This was especially true when golf shoes had metal spikes. The amount of damage has decreased as plastic cleats and spikeless golf shoes became the norm. However, there are concerns that new golf shoe designs may cause more damage than metal spikes did in the past. To investigate these concerns, researchers from Michigan State University and

the University of Arkansas evaluated more than 20 golf shoe designs over two years on putting greens in Michigan, Arkansas, Florida and Scotland.

Researchers classified and compared today's shoe designs with older soles, cleats and metal spikes. They evaluated spikeless shoes, shoes with plastic cleats and shoes with metal spikes. The shoes they evaluated had outsoles made of rubber, polyurethane, thermoplastic polyurethane or thermoplastic elastomer. Researchers simulated 30 rounds of golf with each shoe design on creeping bentgrass, annual bluegrass, fine fescue, ultradwarf bermudagrass and seashore paspalum. Afterward, golfers rated the plots for visible signs of traffic.

Foot traffic generally reduced the visual appearance of surface smoothness compared to control plots with no traffic. Still, there were cases where golfers could not visually distinguish differences among control plots and those that received simulated golfer traffic with certain shoe designs. Flat outsoles with cleat or spike inserts disrupted surface smoothness more than studded outsoles with cleat inserts. Studs increase the number of pressure points and may help disperse traffic by reducing the pounds per square inch each cleat transfers to a putting surface. Traffic from older cleat designs, including metal spikes, was more visible than the most abrasive outsole materials and cleats currently on the market.

Spikeless, rubber outsoles generally caused less visible traffic than spikeless, thermoplastic polyurethane outsoles (Figure 1). In most cases, cleated designs caused more visible traffic than spikeless designs. Cleated, thermoplastic polyurethane outsoles caused less visible traffic than cleated outsoles with a combination of polyurethane and thermoplastic polyurethane. Cleated, thermoplastic elastomer outsoles caused the most visible traffic. In general, spikeless or cleated shoes caused more visible traffic as the number of studs, cleats or cleat prongs decreased.

Researchers also evaluated the impact of putting green management practices on the visibility of foot traffic and overall smoothness. They implemented grooming, lightweight rolling, sand topdressing and fertilizer treatments on creeping bentgrass, annual bluegrass and ultradwarf bermudagrass putting greens. They simulated 20 rounds of golf with an abrasive, cleated outsole on several occasions in Michigan and Arkansas.

There were no visual differences among the plots that received the various cultural treatments before introducing simulated foot traffic. When traffic was applied, it tended to be more visible on creeping bentgrass than annual bluegrass or ultradwarf bermudagrass. Topdressing increased surface firmness, reduced volumetric water content, and reduced the visibility of traffic on creeping bentgrass and annual bluegrass.

Rolling increased surface firmness, volumetric water content and, occasionally, the amount of visible traffic. Traffic was most visible following a combination of rolling and grooming. Researchers hypothesized that these practices provided smoother surfaces, which made the test plots more prone to visible disturbances from foot traffic. It was more difficult to distinguish foot traffic from other imperfections on less-pristine surfaces. It is also possible that increased moisture associated with rolling caused more visible traffic.

Irrigation was consistent over the study area, but results may have been different if irrigation was scheduled based on the soil moisture of each test plot during the study.

At times, the high nitrogen rate used in this study increased the visibility of foot traffic. Because of this, the researchers recommend spikeless shoe designs with rubber or thermoplastic polyurethane outsoles on newly established putting greens that normally require more nitrogen.

Overall, this research emphasizes the importance of an appropriate and frequent sand topdressing program. Frequent sand topdressing increases the firmness and smoothness of putting surfaces, which minimizes indentations from even the most abrasive golf shoe outsole materials and designs.

Source: Thomas A. Nikolai, Ph.D., Michigan State University and Douglas Karcher, Ph.D., University of Arkansas

Additional Information

The Impact Of Putting Green Management On Visible Wear Caused By Golf Cleat/Sole Designs (2017)

The Impact Of Putting Green Management On Visible Wear Caused By Golf Cleat/Sole Designs (2016)

Rain, Golf Shoe Damage, And Continuing Education

FIGURE 1: The general relationship of shoe design factors and the visibility of foot traffic. The visibility of traffic increases from left to right.

	LEAST-VISIBLE TRAFFIC → MOST-VISIBLE TRAFFIC				
CLEAT DESIGN	Spikeless		Cleated		
OUTSOLE MATERIAL	Rubber	Thermoplastic Polyurethane	Thermoplastic Polyurethane	Polyurethane & Thermoplastic Polyurethane	Thermoplastic elastomer
NUMBER OF STUDS, CLEATS OR CLEAT PRONGS	More studs, cleats or cleat prongs				Fewer studs, cleats or cleat prongs