Slipping and sliding to major tennis success

September 8 2015, by Sean Barton

Engineers at the University of Sheffield are working with the International Tennis Federation (ITF) on a device that can measure the effects of friction on tennis courts.

Modern tennis players like Nadal, Murray and Djokovic don't just run around the court, they slide around it too. It's a move that wows audiences and amateurs, and can often give those players the edge over their opponents.

Keen to keep players informed and audiences entertained, the Sheffield team's research will help tennis professionals to understand and measure tennis court friction, ensuring the world's best players are able to slide to

success.

Sliding on clay courts like those at Roland Garros is made easy due to the low-friction nature of the surface. On hard courts, where the friction is much higher, sliding to meet the ball is much like sliding on the pavement. It's a move that has come to the attention of expert observers - including those at the ITF - keen to understand what this new move means for players and for courts.

Dr Matt Carré and Daniel Ura of the University of Sheffield's Department of Mechanical Engineering are working with the ITF to explore the amount of friction generated when players slide with the aim of creating a simple-to-use and portable hand-held device to measure friction.

"Research has shown that the act of sliding is, perhaps counter-intuitively, better for an elite player like Djokovic who will take every advantage to win. The slide enables them to change direction and quickly position themselves on the court to return the ball, and set off for the next return," Daniel Ura explains

"We are working with the ITF to create a handheld device to test friction . This will help them to develop a series of guidelines and parameters for elite tennis courts, ensuring that they prove enough grip for players to play their natural game and to slide in a controlled manner," he adds.

While currently focussed on the professional game, the test may, in due course, have an impact on the amateur and recreational level as these players begin to emulate the sliding movements of the elite level players.

The device Carré and Ura are creating works by mechanically replicating the frictional parameters involved in the complex interaction between the player, the shoe and the surface.

This includes the surface type, player force, sliding shoe orientation and speed that occur during critical player movements like the push off and the slide where maximum performance is needed.

"Our role in the process is to develop a test that is quick and easy to use, but is based on evidence," explains Dr Carré. "The purpose is to ensure that courts reach the standard required for elite play, and enable all players to play to the best of their abilities."

As well as ensuring, quite literally, a level playing field, the research could potentially help tennis shoe manufacturers to create new and exciting shoe designs that will maximise elite players' ability to control their slides. Inevitably surface manufacturers - those responsible for creating the tennis courts for elite play - will become involved in this rapidly developing field too, working together across the sport for the benefit of players and the public.

Jamie Capel-Davies at the ITF explains what the test will meant for the custodians of the sport, and how it will be used: "The ITF already classifies surfaces by their speed of play using court pace rating, which involves firing a ball at the surface and measuring its speed before and after the bounce. We know that the interaction between the shoe and the surface is also important to players.

"Our aim is to have a standard test that will enable us to develop a 'sliding scale' for surfaces. Surfaces can then be rated by their propensity for sliding, e.g. high, medium, low, giving players – as well as court owners and tournament organisers – more information on what the court is like to play on."

In a sport where winning could be the difference between a slip and a slide, it's research with a real impact.

Provided by University of Sheffield