

BALL RESEARCH

Ball Aerodynamics

Since 2001, the ITF has been conducting wind tunnel tests to measure the aerodynamic characteristics of tennis balls. The ITF wind tunnel is similar to those used by Formula 1 teams when designing and redefining the shape of race cars.

Purpose built to hold objects about the size of a tennis ball, the wind tunnel can generate wind speeds of up to 234 km/h (145 mph), using a 19 kW (25 hp) fan. Air is sucked in at the front end and passes through a series of filters before reaching the working chamber, which houses the ball. Curved diverter panels help to cycle the air around the sound proofed room as it exits the exhaust.

As spin has considerable effect on the ball's trajectory through the air, the tunnel has the unique facility of being able to generate spin on the ball. Load cells measure the forces that the ball experiences as it 'flies through the air'. The first of these is the force in the horizontal direction, which tends to slow the ball down and is known as drag. The second acts in the vertical direction, and tends to either keep the ball in the air or return it to the ground, depending on whether it has topspin or backspin.

In May 2003, a wind tunnel was installed in the Technical Centre. The only tennis ball wind tunnel in the world, the ITF is using it to conduct research into the aerodynamic characteristics of tennis balls.



Dynamic Ball Testing

The dynamic properties of tennis balls is another area that we monitor to see how the balls react during high speed impacts. A piece of equipment referred to as the "bazooka" has been specially commissioned to test these properties.



Impact speeds in tennis can be very high. For example, in a smash, the ball can hit the court at over 180 km/h (112 mph). To simulate the effects of high-speed impacts in tennis we use a 'bazooka' air cannon that is capable of firing a ball at this speed. This equipment can be set up to model the impacts between balls and both rackets and surfaces.

