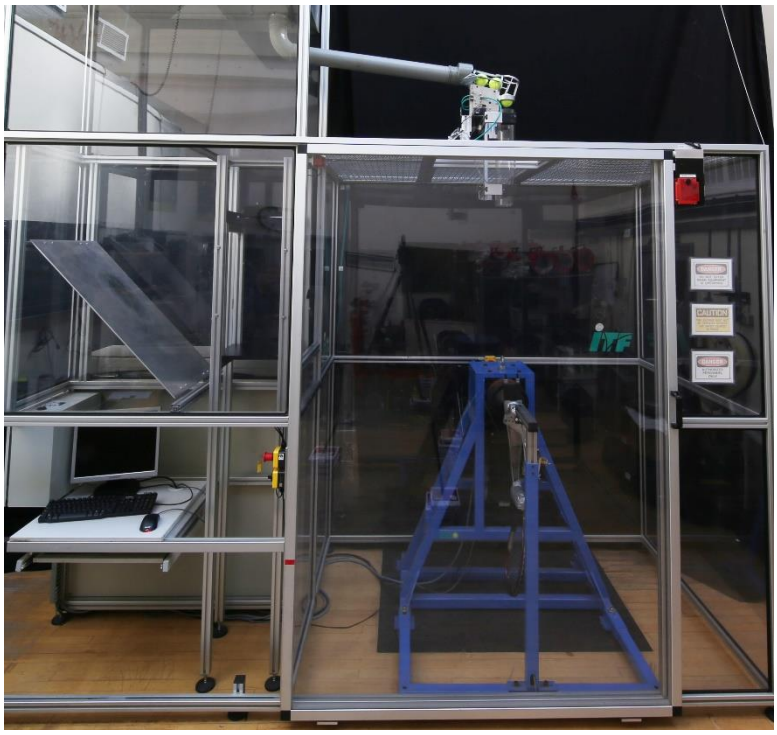
RACKETS AND STRINGS RESEARCH

Racket Performance

The racket performance machine (known as "MYO" – the Greek word for muscle) is a custom-built machine designed to measure the maximum power a racket can generate. Each racket is tested using three different racket speeds and six different impact locations on the face of the racket to identify the optimal power point on the racket head.

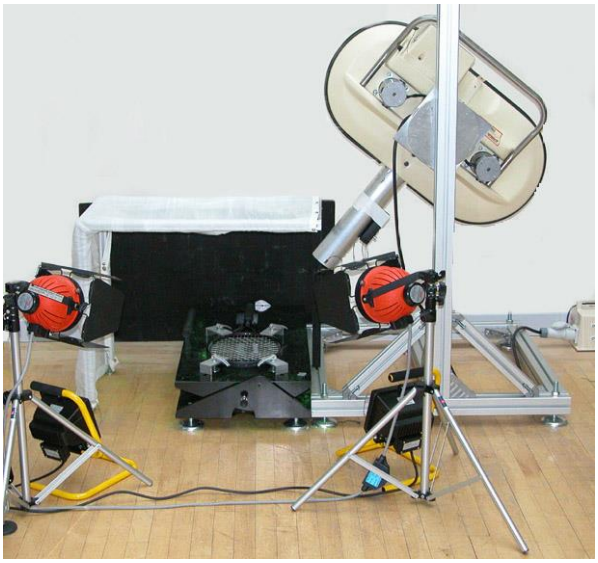


The MYO simulates a tennis serve using a powerful motor to rotate the racket in the vertical plane. A ball is dropped from above the racket and is programmed to drop the ball at a designated impact location, which is measured from the tip of the racket when it is in the vertical position.

At impact the ball is fired through a set of light gates, which gives the in-coming and out-going ball velocity, therefore producing a measure of ball speed. The maximum ball speed at all three test speeds will be used to indicate the racket's power. The MYO can produce a maximum ball speed of approximately 210 km/h.

The aim is to benchmark all performance rackets from major manufacturers to produce an independent database of racket power values.

Spin



The ITF Technical department, in association with the University of Sheffield, has designed and built a test rig that is able to measure the amount of ball spin which is generated by a tennis racket.

In this experiment, tennis balls are projected at 25 m/s (90 km/h) on to a clamped tennis racket. Tests are conducted for a range of inbound ball spins between zero and 4000 rpm (400 rad/s). The ball impacts with back spin and rebounds with top spin. This simulates the change in spin which occurs in a typical topspin ground stroke. The ball is projected at both 40 and 60 degrees to the vertical, to simulate two different 'severities' of topspin ground stroke.

A high speed video camera, operating at 1000 frames per second, automatically records every impact. In total, forty two impacts are recorded for each racket. Bespoke image analysis software has been written which automatically measures the velocity, angle and spin of the ball, before and after impact.

The aim of this project is to benchmark the amount of spin produced by all the strings that are currently on the market. This will enable us to identify the effect of string tension, gauge and type on ball spin generation. In addition to this, we will also look at other factors which may effect spin generation, such as head size and string pattern.

The stiffness of strings are also being tested to examine the relationship between string stiffness and spin generation.