



In search of the Perfect Putt

“Putting is an art not a science,”

claims Ben Crenshaw, which is all very well when you're blessed with the perfect stroke of that particular two-time Masters champion. But for the rest of us – and that includes tour pros such as Padraig Harrington and Rory McIlroy – science is very much transforming our understanding of the mechanics of putting and the way both our stroke and our equipment influence the vital dynamics of the golf ball on its final journey.

In the same way that conventional launch monitors such as TrackMan, Vector, FlightScope and Foresight GC2 have revolutionised the long game, so the equivalent technology for the more modest – but most used – club in the bag is now emerging as an essential part of the clubfitting process for golfers of all levels.

One session on the latest Quintic v2.4 system will dramatically alter the way you think about the very nature of putting: opening your eyes not only to obvious alignment issues but, more fundamentally, to the nuances of ball speed, spin, launch angle and the nature of true roll.

Quintic does all this through a state-of-the-art camera which (operating at 260 frames-per-second) only needs to capture the movement of a

Following last month's putting instruction featuring Dr Paul Hurrion's work with Rory McIlroy, we focus on how the same coach's Quintic Ball Roll putting analysis system is now guiding regular golfers – as well as tour stars – to the correct specifications and stroke. **Dominic Pedler** reports on the ultimate launch monitor for your putting.

specially marked golf ball over the first 12 inches of its journey for the software to impute all the clubfitter needs to know about your clubface contact and the resulting influence on the ball in terms of the roll and path of putt.

While some of the parameters Hurrion himself summarises below can get rather techie in nature, it's worth stressing that Quintic is emerging as a highly practical tool, in practice, both for coaches as a teaching aid and for clubfitters who can now match a player's putter specification to their style of stroke far more swiftly and efficiently than ever before.

Previously privy only to Hurrion's roster of tour pros (which, along with McIlroy and Harrington, includes Lee Westwood and Robert-Jan Derk-

sen), the Quintic software is now available to all through the network of Gel Golf Fitting Centres around the country. You don't have to use a Gel putter to be assessed by a Hurrion-trained expert – though you may nevertheless want to one a try (see sidebar on Grooves).

It's worth mentioning that Hurrion came into the business of equipment 'micro analysis' following his time as personal biomechanist to British javelin legend, Steve Backley, over the course of two Olympics.

“As well as measuring all the speeds, angles and trajectories of the javelin itself we would analyse all the body movements, such as shoulder separation, etc, using everything from force platforms to 3D simulation,” he recounts. “Back

in those analog days, the number crunching could take as long as 24 hours to get the data for each training session. Now with the latest digital putting technology, the numbers and the feedback to the player are instant.”

Following Gi's visit to The Belfry to see the system in action, here is Hurrion's instant guide to the putting parameters that the Quintic v2.4 measures (illustrated by some accompanying screen grabs) and why they matter so much to your own putting game.

PAUL HURRION'S GUIDE TO THE QUINTIC V2.4 PUTTING DATA

Unlike the long game, where hooks and slices and their causes are far easier to spot, many putting flaws are invisible even to the trained eye. So the Quintic process starts with helping the golfer to understand the result of any putt – why they missed the hole, whether through alignment or from a particular ball dynamic at impact. Have they pulled it? Have they hit it slightly out of the toe generating some hook-spin? Was it mis-alignment at address? Or have they hit a good putt but just mis-read it?

Unless you know what it is, you can't work on your game in any meaningful way. It only takes half a dozen putts for Quintic to paint a highly revealing picture of a player's putting profile. Here are the main things we look for:-

1) Ball speed

Obviously the pace of any putt is crucial, but developing a consistency of ball speed for any given length of putt is an often overlooked factor. If you've got more than 1 mph variation in pace for the six putts of 20 feet in our typical test, you're going to be struggling. You might hit most of them at 5 mph – but even a 1 mph variation will make a difference of some 4 or 5 feet.

The software also includes a special graph of ball speed over time, where we're looking for a fairly straight line reflecting a uniform deceleration to confirm the golf ball is hugging the ground throughout the putt. A wavy line shows there are moments when the ball is in the air and the putt is therefore slowing at different rates.

This information really helps the golfer to understand the importance of pace and feel, and the clubfitter to identify what loft the player needs on their putter to get a smooth roll.

2) Side spin

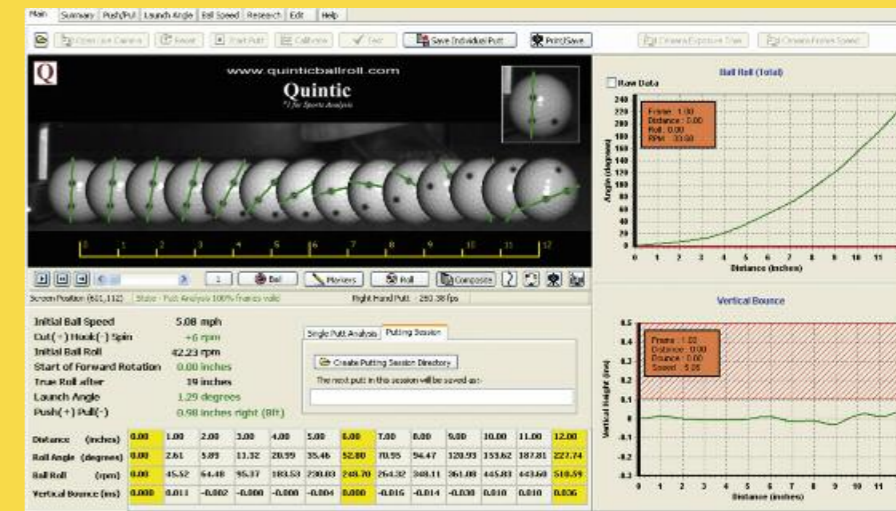
Just like any other club in the bag, the ball can come off the putter face with hook-spin or cut-spin. Anything below +/- 10 rpm doesn't have an effect on where the ball ends up. 10-20 rpm is usually OK, but anything above that and you can see how the ball bounces and deviates from the intended path.

The task is then to see what is causing that sidespin: whether it's swing path, face alignment, or perhaps a faulty set-up or lie angle that makes the toe sit above the ground affecting the weight distribution at impact.

It's all very well saying that if a particular spin is consistent it doesn't matter. But if you've got a

Profile of the perfect putt

For many of us it will prove quite a challenge to strike a putt with just the right launch conditions to promote the perfect roll, as measured by the Quintic software.



Here's an example of the results from one European Tour professional from which Hurrion makes the following key observations:-

- Below 10 rpm of sidespin is excellent. +6 rpm is actually negligible and will have no effect on the ball's path.
- The ball started its forward rotation immediately after impact, wasting no time through skidding.
- Initial ball speed is 5.08 mph which results in the golf ball travelling approximately 19 feet on a flat green with a Stimpmeter reading of 12.
- The point of 'True Roll' occurs after 19 inches – which is even better than our guideline of 10% of the travel distance.
- The Launch Angle of 1.29 degrees is excellent and the result was a smooth forward roll for the first 12 inches of the putt.
- The golf ball has rotated 227 degrees after the first 12 inches of its path, with 510 rpm of forward rotation at this point. The increased rpm values is something we are trying to achieve, thus ensuring the ball is rolling out smoothly and using up energy sooner.

cut-spin stroke then you'll have to read a putt with a left-to-right break differently to one with a right-to-left break. Do you want that variability in your game?

3) Initial ball roll

For initial ball roll we want a positive figure to confirm that the ball is rolling forwards, and not starting its journey with backspin which many players generate for various reasons – most notably launch angle, as we discuss below.

This notion of 'topspin' is an area that has preoccupied putter designers in recent years, as shown especially by the rise of groove-faced putter designs [see separate sidebar].

But too much topspin – anything more than 100 rpm – is detrimental. Rather like an extreme topspin forehand in tennis, the golf ball can also jump up extra high on that first bounce. The effect will be most apparent when the green is sloping: the ball will react by stopping more quickly into an upward slope, or pitching exaggeratedly and running off wildly on a downward slope.

4) True roll

Ideally your putt should display true forward roll as early as possible after impact, making the ball much less prone to straying from its path as it will be less susceptible to imperfections in the green, spike-marks and debris.

True roll is measured here as the distance it takes for the golf ball to make a full 360-degree rotation after impact. In theory, this could be as little as just over 5.25 inches – the circumference of a standard 1.68 diameter ball. But, in practice, the ball will inevitably skid off the face for a while, remaining on its axis before starting to roll forward.

There's naturally more skid the longer the putt and the harder you hit it. But, as a general rule, a putt should achieve that first full rotation within 10 per cent of the total target distance [eg. within 18 inches on a 15ft putt]. If not, there is something you and the clubfitter can improve on – typically loft, as we discuss below.

5) Launch angle

Another vital area often overlooked is the angle at which the ball leaves the putter face. Again, this

Padraig's Putting Panacea

Paul Hurron has worked for some seven years with Padraig Harrington as his putting adviser and biomechanics analyst. In fact the three-time major champion is so impressed with the Quintic system that he has his own unit installed in his home.



Hurron on his latest work with the Irishman... "We've been working, in particular, on the 15-20ft range. After all, the stats tell us that Padraig led the tour last season in three-putt avoidance, while his holing-out from short range is phenomenal. Of the 1,000, or so, putts within four feet he had in 2010, he only missed one in the whole season!

The most important recent change has been some subtle changes to the specifications of Padraig's Odyssey 2-Ball putter. His typical straight putt generates about 25 degrees of hook-spin – slightly above the ideal range – which was causing some trouble, particularly on right-to-left breaking putts.

He's therefore moved to a more face-balanced design chosen from a range of prototypes with slightly longer hosels that Odyssey made specifically for him. Moving to what is effectively a slightly lighter toe has helped him reduce the tendency for the face to close, which in turn is successfully moderating the natural hook-spin of his stroke and thus reduces the hook spin to minimal values."

This idea of a lighter toe reducing hook spin is interesting – as it would appear to be the opposite of the weighting advice on adjustable weight drivers. We asked Hurron about this.

"It is largely dependent on the style of stroke," he explains. "We have had players for whom hook-spin has decreased by increasing the toe hang. It is all about matching the release of the putter (headweight and toe hang) with the natural hand release of the golfer through impact. Some players block at impact, others like to release the right hand, etc. With the help of the data, the skilled fitter can fit for a golfer's individual style."

varies according to the length and speed of putt but, for 5 mph of ball speed on a typical 15-foot putt, we've found the ideal launch to be around 1 degree. Anywhere between 0.7 and 1.5 degrees is good. But anything more than 2 degrees and the ball literally takes off, making it bounce higher (and more often) and be subject to deflection from its intended path every time it lands.

In the accompanying screen grab, the golf ball has started with as much as 4.03 degrees

of launch angle, which also has the effect of imparting 45 rpm of unwanted backspin. The ball has to travel over eight inches before it is back to merely the same axis as when it left the putter face – it hasn't yet rolled forward at all.

We often see this with players who generate too much dynamic loft at impact, those who break the wrists just before impact, and those who have the ball too far forward in their stance.

Too little launch, however, and the ball is driven directly into the ground from where it will again bounce more in the early stages rather than riding smoothly over the grass.

The ball can also be hit with negative loft – caused by the opposite of the factors just mentioned – striking it directly down into the grass before, again, bouncing up and compromising true roll and topspin.

Using the data for putter fitting – a quick summary

Understanding and quantifying the above parameters helps hugely both in helping a player to improve their technique and in correctly choosing a putter and fitting the specifications to their stroke.

Take loft, for example. Most putters come with 3 or 4 degrees of static loft, so to achieve the desired launch of around 1 degree, the player will need to de-loft the face by some 2 degrees dynamically.

Whether you can do this depends hugely on your style of stroke. For example, Phil Mickelson has a pronounced 'forward press' where his hand action de-lofts the clubface by some 5 degrees. To achieve the ideal 1-degree launch he therefore needs to start with a static loft on his putter of at least 6 degrees.

At the other extreme, Zach Johnson – who

Into the groove

The science behind the modern grooved-face putters

From a design as well as a performance point of view, the Quintic camera and software system is ideal for comparing different types of putter faces, including the effect of groove configurations in improving the golf ball's impact and roll characteristics. [So much so that Quintic is currently adopted by the R&D departments of top putter companies such as Ping, Taylor Made/Rossa, Srixon and Adams Golf.]

Hurron himself developed his own interest in putter grooves following a research paper, a few years ago, into the distinctive C-Groove faces found on Yes!Golf putters. This confirmed that grooves can make a significant improvement in terms of reducing skidding and generating for-

ward roll sooner than otherwise, and led him to develop his own range of groove-faced putters for Gel Golf.

"Grooves give you less surface area when striking the golf ball, allowing the edge of the groove to make a distinctive contact with the soft cover of the ball. A well constructed groove will actually 'grab' the

ball momentarily at impact, creating a higher frictional force which, in turn, promotes a more efficient contact and roll.

And, just like on irons and woods, grooves on putters help markedly when there

is any water on the face, which the grooves help to disperse. On a plain-faced putter you get far more variability in results depending on the amount of moisture on the face.

But much depends on the type of groove configuration, in particular the angle at which the grooves are set. Inferior grooves combined with an inferior stroke and an off-centre strike can actually increase the sidespin (which you don't want) rather than just the topspin (which you do).

The type of golf ball you play is also a factor, with different levels of cover softness and dimple configuration affecting the contact and the amount of friction. Though this whole area warrants further research."



has his hands well behind the ball both at address and impact – needs just the opposite. He actually needs negative static loft to achieve a positive 1-degree launch.

[Note: you don't need to change your putter to change the static loft. On his recent visit to Quintic, Dominic had his putter de-lofted in seconds on the loft & lie machine by Paul Hurron, yielding an immediate improvement in his launch angle.]

Similarly, the data helps us determine the best specs for shaft length and lie angle as well as the important decisions as regards blade vs. mallet, centre shaft vs. heel shaft and face balanced vs. toe heavy.

The latter is particularly important as subtle head weighting nuances can have a dramatic influence on your putting according to your style of stroke [see Padraig Harrington sidebar].

Even the thickness of the shaft and distribution of the weight throughout the length of the club can have an important effect, and the club fitter may well recommend this, for example to encourage a more pendulum action.

Ultimately, the Quintic system is all about fitting the putter to the player's posture and stroke – rather than the other way around.

Note: a custom fitting session at a GEL Fitting Centre costs from £25 for a 30-minute fitting using the specially-designed GEL fitting tool, alignment mirror and ProStance system as well as the Quintic Ball Roll Software. A directory of fitting centres can be found at: www.gelgolf.co.uk

For more information visit www.quinticballroll.com and www.gelgolf.co.uk

WIN A CUSTOM-FIT GEL PAUL HURRION SEDO II PUTTER!

In association with GEL Golf, Paul Hurron has launched a number of GEL Fitting Centres around the UK that reflect their philosophy that for the best results on the greens, putters need to be specially-fitted to the individual.

Hurron is convinced that whilst most golfers recognise the benefits of custom-fit irons and drivers, it won't be long before custom-fit putters really taking off especially given the number of times a player uses his putter in a round of golf.

Hurron's unique fitting procedure uses specially-designed GEL equipment (a fitting tool, GEL mirror and ProStance) and nine skill drills alongside the Quintic Ball Roll Software that tracks the performance of the ball as it leaves the putter face in a similar way that Trackman follows the flight of the ball off clubs and irons.

"Once you know exactly what is happening to the ball thanks to factual data provided by the Quintic Software, it is easy to provide expert advice on how to alter the putting stroke, posture, change the set-up of the putter or even recommend an entirely different type of putter in order to improve a golfer's putting skills and hole more putts," says Hurron, who also linked up with GEL to co-

design the GEL Paul Hurron Signature Range of Groove Putters.

GEL Golf's unique groove and insert technology that it uses in all of its putters is based on scientific testing that has proved that the use of grooves in the putter face creates instant forward roll on the golf ball, thus reducing the unwelcome effects of skidding and giving a truer roll. The GEL Paul Hurron Signature Range uses light aluminium inserts allowing weight to be distributed elsewhere in the putter head, pulling the centre of gravity up the putter face increasing forward roll. The Hurron putters also incorporate tungsten weights to create MOI, and different shafts to reduce torque, particularly on miss-hits.

To enter, simply answer the following question:
How many drills come with the GEL Training Mirror designed by Dr Paul Hurron

Answer A: 3 B: 6 C: 9

To enter visit: www.golfinternationalmag.com/competitions or answer on a Postcard to: GEL Competition, Golf International Magazine, 10 Buckingham Place, London, SW1E 6HX

COMPETITION CLOSES AT MIDNIGHT ON 31ST MAY 2011

For more on GEL Golf, visit www.GELGolf.co.uk

GEL Golf is offering three Gi readers the chance to be custom fit with a GEL Paul Hurron Sedo II at the nearest GEL Fitting Centre with each fitting and putter worth over £200.