

## Contents

Page **01** **TrackMan™ Launch Takes Off** 

: Setting new standards for indoor launch monitors

Page **02** **Anders Hansen Finds The Right Path At Wentworth** 

: Successful focus on club path improvement

Page **04** **TrackMan™ On Tour** 

: Cases from the PGA TOUR and LPGA Tour

Page **06** **TrackMan™ Presence At The Majors Continues** 

: Assisting at Oakmont and Carnoustie

Page **08** **TrackMan™ Club Delivery Data** 

: A graphic explanation

Page **10** **TrackMan™ Strengthens Position In US College Golf** 

: LSU and ETSU enhance their golf training facilities

Page **11** **Recipe For A Hole-in-One** 

: Luke Donald shows the way

## TrackMan™ Launch Takes Off

**The indoor version of TrackMan™ is entering the market these days. With TrackMan™ Launch, indoor launch monitoring takes a big step forward.**

As TrackMan™ Pro has proven its undisputed value under the open golf sky, many different parties working with club fitting and instruction have expressed a great need for an indoor version of TrackMan™. ISG now meets this increasing demand by presenting TrackMan™ Launch, taking the quality of indoor launch monitors to another level.

“Several parts of the golf industry have signaled that the existing indoor launch monitors do not obtain a sufficient level of accuracy. We have worked hard for two years to obtain a product that aims higher and sets new standards. The problem with existing launch monitors is that they in general only measure a few of the launch conditions and usually with problematic variability. TrackMan™ Launch on the other hand measures all the launch conditions with the same level of precision as TrackMan™ Pro, then calculates the trajectory and landing data very accurately due to a world class ball flight model. The result is state-of-the-art club delivery and ball launch measurements yielding very accurate trajectory shape and distance calculation. This has the ability to turn indoor golf into serious golf. We really encourage all indoor launch monitor users to take a thorough look at the quality of their equipment to make sure they are providing their customers with the level of quality and accuracy they deserve”, says Fredrik Tuxen, CTO at ISG.

Particularly, measuring the spin of the ball with the world's highest accuracy ( $\pm 15\text{-}20$  rpm) makes TrackMan™ Launch unique. The accurate spin rate measurement is a key factor for TrackMan™ Launch in providing an accurate trajectory calculation. “Technically it is very challenging to measure the spin rate when the ball flight is terminated in a net after just a few yards, but we have lifted this challenge, and this is of great value to TrackMan™ Launch customers”, Tuxen continues.



TrackMan™ Launch in operation at Precision Golf, England.

With the launch of the indoor product, TrackMan™ Launch and TrackMan™ Pro now constitute ISG's two main products.

Existing TrackMan™ Pro customers will recognize many of the features found in TrackMan™ Launch, which will make the indoor product easy to use for them.

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## Anders Hansen Finds The Right Path At Wentworth

This is the story of how focusing on one of TrackMan's club delivery data parameters, club path, helped Anders Hansen win his second PGA Championship title at Wentworth in 2007.

It is April 14. Two weeks earlier, Anders Hansen had a poor showing, shooting a final round 76 at Shell Houston Open, the town where he graduated as a student. Now, standing on the practice range in Hornbaek in his native Denmark, he is looking for an explanation of an unsuccessful opening to his inaugural PGA TOUR season. In his company is Ulrich Marcher, one of his two coaches, Fredrik Tuxen, CTO at ISG... and a TrackMan™.

"It was not an easy problem to solve", Tuxen remembers, "The symptoms were quite clear, Anders was hitting down on the ball - a negative attack angle. His club path was also negative, or outside to in. In general, Anders reported that he was having trouble controlling his ball flight. However, during the three hour session he tried to change his swing in order to improve the numbers, they did not change significantly".

Frustrated, Anders went back to the States and missed the cut in the Zurich Classic by 8 shots. The week after, he did improve his form with a T44 finish at the EDS Byron Nelson Championship. But proving that the struggle was far from over, he went directly to the Italian Open on the European Tour and ended up T56 on the Tolcinasco course where he had finished 2, 2 and 9 the three previous years. Jet lag or not, Anders' struggles were far from over.

Anders decided to take a 3 weeks break from tournament golf and went again to Denmark to work more on his TrackMan™ numbers together with his other coach, Magnus Landström, who has a TrackMan™ at his golf academy in Horsholm. Landström has worked with Anders since 1998, when Anders was on the Challenge Tour.

"The swing was not looking good. The back swing was much too flat and the club was clearly off-target at the top of the swing. Further, Anders was not at all comfortable with his swing thoughts and swing feelings. So we went back to basics. We focused on Anders' club path and after a lot of work we identified the two main reasons for the negative numbers. First, Anders' position over the ball was not good. He was flexing his knees too much instead of creating the right contraction in his upper body. That created a non-optimal point of departure for his

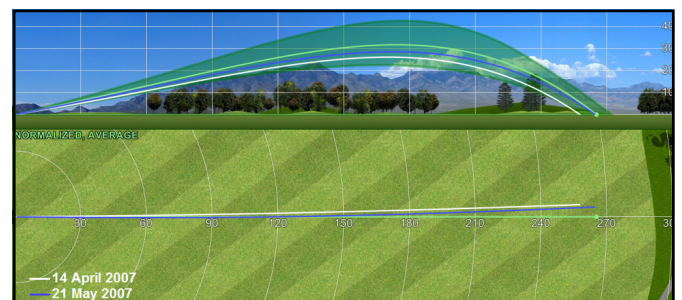
“ I am getting addicted to TrackMan™. ”



Anders Hansen

torso rotation in the swing. Second, that proper torso rotation was not good as he moved away from his ideal lines and did not get into the right position at impact. But with hard work, the numbers got better and better", Landström recalls.

The next tournament Anders was to play was the BMW PGA Championship at Wentworth, the tournament he won in 2002, his only European Tour title to date. On Monday May 21st, three days before the first round, Anders was doing the final preparation with TrackMan™ back in Denmark. Data in the table below show the improvement for his driver. "I am getting addicted to TrackMan™", he told ISG's representative the next day on the range at Wentworth, full of optimism.



	ATTACK ANGLE [deg]	CLUB PATH [deg]	FACE ANGLE [deg]	HORIZ. LAUNCH [deg]	SPIN AXIS [deg]	CARRY [yds]
14 April 2007	-1.1	-2.7	-0.2	-0.6	-1.7	255.3
21 May 2007	-0.8	1.4	0.5	0.6	-3.9	264.0



## Anders Hansen Finds The Right Path At Wentworth (continued)

Anders' hopes were not unfounded. Over the 4 tournament days, he would hit 45 fairways out of 56 and 59 greens out of 72, tee-to-green stats that were unmatched by anyone in the strong field. A final round 69, 3 under par, in very tough, rainy conditions was a symbolic manifestation of how consistent his swing was that week at Wentworth. Anders' relatively high putting average of 31.5 putts per round positioned him in a first place tie with Justin Rose at the conclusion of regulation play. But then, on the first sudden-death play-off hole, his putting improved dramatically when it mattered most as he drained a 25 foot birdie putt to win the tournament.

"It was not an easy course for this kind of problem solving", Landström points out, "Over the last few years, the course had been lengthened, more obstacles had been added, and the greens are just tricky and built for high iron approach shots. Yet, Anders was swinging the club so well that the difference between his 5-iron and 8-iron accuracy was very small. He felt comfortable, and he finally found the balance between his swing thoughts, swing feelings, his position over the ball, his torso rotation and his understanding of the numbers and how he had changed them. His swing was so consistent and solid that he had the same attack angle with his Driver and 6-iron, and his club path was right. He felt safe and confident, and he played his best".

For Anders himself, the victory was not surprisingly a huge relief and a turning point of a season that subsequently led to strong and consistent performances in the three remaining majors. "It was just a fantastic feeling because I had put in so much hard work and effort in the weeks before Wentworth. My coaches did a great job, and my caddie, John McClaren, was indispensable. But working with TrackMan™ was also a key factor behind my victory, it helped me and my coaching team solve the swing issues in time", Anders says.

Landström looks back on the process, "We learned a lot about how we should work with TrackMan™. It is superb for training as it is invaluable for the coach and player to get instant feed-back to a shot in order to store the right feeling in the mind and body of the player. However, TrackMan™ has to be used in the right way. It is dangerous for a player to force an improvement of the data. Actually,

“ We will work on club path, club path and club path. We will look at the different numbers but that is the one parameter we will constantly monitor and work with in the future to ensure that Anders' swing plane is right on track. ”



**Magnus Landström**  
Anders Hansen's coach

Anders has always been good at solving minor flaws in his swing by squaring his club up to the target. But this problem was not solved that easily - what happened for Anders was that he made his back swing, which was already too flat, even flatter in order to improve his attack angle and club path and that was not the right way to go. Yet, with hard work and patience, we found the right medicine and made the needed swing changes.

We also had to accept that Anders has his individual swing characteristics and he does hit down on the ball slightly, creating a slightly negative attack angle. We will live with that, and then we will work on club path, club path and club path. We will look at the different numbers but that is the one parameter we will constantly monitor and work with in the future to ensure that Anders' swing plane is right on track".



Anders Hansen on the range with TrackMan™ at the 2007 Volvo Masters at Valderrama.

## TrackMan™ On Tour

**Helping PGA TOUR and LPGA Tour players optimize their swing and equipment.**

The world's best players have TrackMan™ at their disposal nearly every week. TrackMan™ is now available on the driving range Monday through Wednesday during most PGA TOUR events. Likewise, TrackMan™ is available at selected LPGA Tour events. On both tours, players use TrackMan™ for club fitting, gap fitting, ball testing, approach practice or simply shot analysis.

ISG's representative in charge of the on site measuring service for PGA TOUR and LPGA Tour players is Justin Padjen who has more than 4 years experience in advanced club fitting. In addition to working with the tour pros on the range, Justin also supports equipment manufacturer representatives with their objectives of fitting tour players to their optimal equipment specifications. Equipment manufacturer representatives also use the TrackMan™ information from tour events to aid in the design and development of new products for golf's consumers.

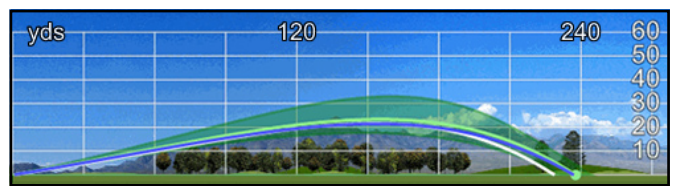
For every tour event covered by TrackMan™, Justin posts a tour diary at [www.trackmangolf.com](http://www.trackmangolf.com) with great details of how tour players work with TrackMan™ and how the advanced technology helps them improve their games and select the right equipment. Listed below are some examples of how PGA TOUR and LPGA Tour players have used TrackMan™ this season:

### Club fitting – choosing the right driver

At the McDonald's LPGA Championship, Paige MacKenzie, a rookie on the LPGA Tour, had a Nike Sumo driver in her bag, but Nike had built her another Sumo with slightly different specs to help gain a little more distance. As she tested the "new driver" using the TrackMan™ Driver Fitting application, her optimal launch conditions were identified by her swing characteristics (primary club speed and attack angle).

	BALL SPEED [mph]	LAUNCH ANGLE [deg]	SPIN RATE [rpm]	CARRY [yds]	TOTAL [yds]
Driver	146.4	8.1	3250	228.7	250.7
Driver New	147.5	9.2	2744	235.1	260.7
<b>TrackMan™ Optimizer</b>					
Max. Carry	147.3	9.7	2867	237.8	261.5
Max. Total	147.8	8.7	2591	235.5	263.9

It is clear that the new driver is superior as she gains almost 7 yards in carry and 10 yards in total distance compared to her existing driver. Also, the new driver falls in between TrackMan's optimal carry and total numbers. Not surprisingly, she put it in her bag and played with it that week – and she told Justin it was great. Here is the graph showing the optimal carry (light green) together with the average trajectory of her old driver (white) and the new driver (blue). Perfect job done by the Nike clubmaker!



### Club fitting - testing V Grooves

Joey Sindelar, with seven PGA TOUR wins over his career, tested different driver head and shaft combinations. He also tested different 3 wood head and shaft combinations, but the main purpose of his testing was to evaluate numbers on his new TaylorMade r7 TP irons. The new heads had special V-shaped grooves. Joey has long experienced problems with spinning the ball too much with his irons. These new grooves are designed to spin the ball less, so he wanted to put them to the test. What was the verdict?

The new r7 TP heads with the V grooves do seem to spin the ball a little less than before. The new heads which are designed with a lower center of gravity compared to their predecessor also produced a slightly higher launch angle. Here are some of the numbers from the test.

	LAUNCH ANGLE [deg]	SPIN RATE [rpm]
9i	20.2	10 501
9i New	20.4	10 252
8i	18.6	9 292
8i New	19.3	8 811
7i	16.9	8 172
7i New	17.8	7 929
6i	13.4	6 846
6i New	13.6	6 695

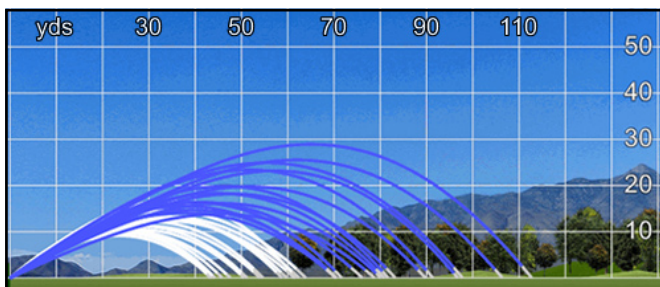
## TrackMan™ On Tour (continued)

### Gap fitting – the importance of lofts and lies

At The Bridgestone Invitational in Akron, Ohio, Jerry Kelly had new Cleveland irons and wanted to make sure that the distance gaps were correct. He hit through all of his irons and wedges. From the data, it looked like there was a problem with his 6 iron. It didn't seem to be carrying far enough. When the player looked at the data, he said he knew there was something funny going on. Last week was the first time he had played with the new irons and he knew there was something wrong with the 6 iron. After two of the Cleveland representatives came over and watched him hit more shots with his 5, 6 and 7 iron, they took the 6 iron to the truck to check the loft and lie. Both the loft and lie were off by 0.5 degrees - even though that doesn't seem like much, TrackMan™ data helped reveal the underlying issue.

### Approach practice - distance control is everything

Multiple players use TrackMan™ to practice their wedge distances. The 2006 PGA TOUR Rookie of the Year, Camilo Villegas, would call a yardage and then try and produce a shot that would carry that far. He started at 40 yards and worked his way up to 110 yards. He would hit 3-5 balls at increments of 5 yards. This type of practice will allow the player to create a swing that hits the ball the desired distance. This can really help with muscle memory and distance control. Here is a picture of the shots that Camilo hit. The different colors represent different lofted wedges.



Another thing that most players are interested in knowing with their wedges is their possible maximum distance. The players like to know: what is the farthest that I can hit a particular club? They pay attention to this yardage even more so with the wedges and short irons because they feel they can really control distance with the shorter clubs even with a harder swing.

### Shot analysis - finding your flaws

Paula Creamer, one of the LPGA stars, felt that she had lost some distance with her driver. One thing is certain - the negative attack angle with her driver was not helping. The numbers from two of her better swings with her driver were as follows.

	CLUB SPEED [mph]	ATTACK ANGLE [deg]	BALL SPEED [mph]	LAUNCH ANGLE [deg]	SPIN RATE [rpm]	CARRY [yds]
Shot 1	98.2	-0.9	142.5	10.7	3101	227.3
Shot 2	98.0	-0.8	141.7	10.9	3160	225.7
TrackMan™ Optimizer for max. Carry						
Current Attack	98.1	-0.8	143.8	11.5	3050	230.5
+5 deg Attack	98.1	5.0	144.6	15.1	2580	243.1

The attack angle is the vertical movement of the club at impact. This means that with her driver, the club head is moving down and has not reached the bottom of her arc yet. As she is hitting down on the ball, she is creating too much spin for her ~11 degree launch angle (note spin rates above 3100). She will not be able to achieve the famous high-launch, low-spin shot that everyone strives for with her current attack angle. Given the absolute optimal launch conditions with her club speed, she should be able to carry it more than 240 yards. In order to achieve this distance, her attack angle would need to be positive 5 degrees (the club moving upwards 5 degrees at impact). Although this would be quite different than her current swing, there are many top-tier LPGA players with this type of positive attack angle.



## TrackMan™ Presence At The Majors Continues

TrackMan™ is found in many places around the golf world. Of particular importance as venues for data collection are the majors. Therefore, to assist the USGA and The R&A with measuring for further development of the game of golf, TrackMan™ was again present at the US Open and The Open Championship to analyse shots from the best players in the world.

For the third year in a row, the USGA selected TrackMan™ to assist in measuring competitor shot data for the 2007 US Open. As a new step in TrackMan's contribution to the US Open, player launch and trajectory data were captured for the first time in USGA tournament history during live competition at the championship conducted in June at Oakmont CC.

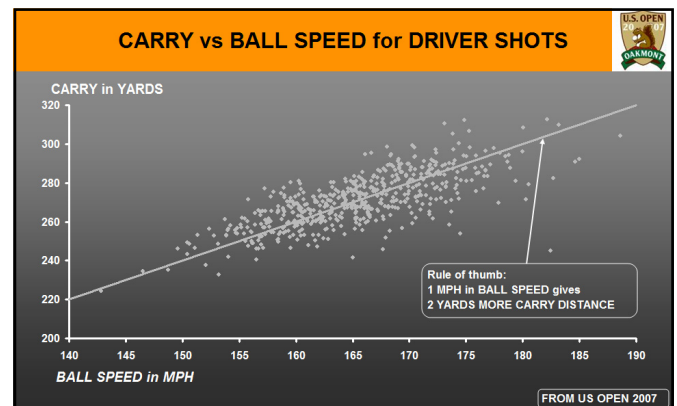
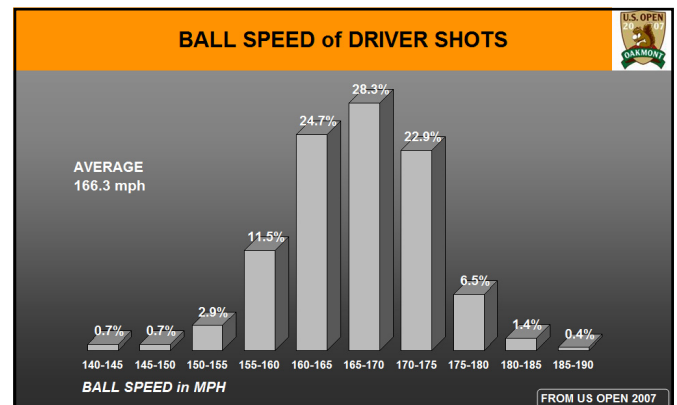
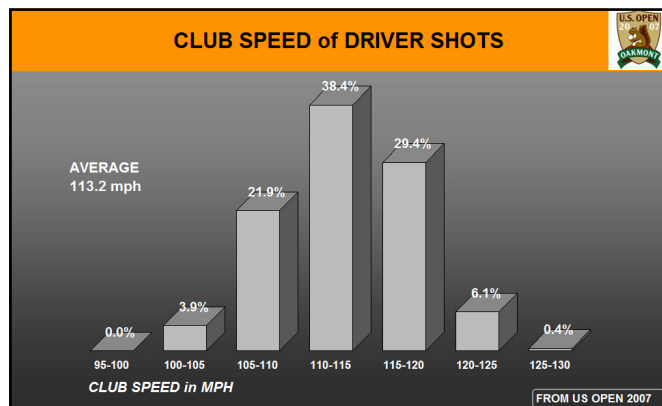
The purpose of TrackMan's presence was for the USGA to acquire accurate ball flight and club data for the world's top players. The captured data will be used by the USGA for further validation that their test conditions accurately represent the performance capabilities of the top players and for historical reference.

"The US Open is a great opportunity for the USGA to measure launch conditions and swing performance of the best golfers in the world. TrackMan™ has given us the ability to do this accurately, efficiently and reliably without any interference to the US Open competition or its competitors. TrackMan™ once again was a key asset in our effort to monitor the game of golf during top competition", said Dick Rugge, the USGA's Senior Technical Director.

On the three practice days and during tournament rounds 1 and 2, TrackMan™ captured tee shot data on launch, flight and carry for all players. "The average swing speed measured was about 113 mph, which is quite similar to previous years' measurements", said Dick Rugge.



TrackMan™ measures Vijay Singh's drive on hole 7 at the US Open 2007 while Mike Weir (on the right) is watching.



# TrackMan™ Presence At The Majors Continues (continued)

## From Oakmont to Scotland

A month later, at the 2007 edition of The Open Championship at Carnoustie Golf Links, The R&A had once again selected ISG's TrackMan™ technology to measure and analyse ball flight and club movement data throughout the competition.

Dr. Steve Otto of The R&A explained, "TrackMan™ has proven itself over several accuracy assessments and test events, including last year's Open Championship. We use TrackMan™ technology as part of our ongoing extensive research and testing. We are highly confident in the system and look forward to reviewing the TrackMan™ data following The Open Championship so that we may better understand how today's players approach our golf courses and play the game".

During every practice and competition round, ISG's TrackMan™ Tour System collected player shot data on two holes, #6 and #10. The data, some of which were broadcast live to television viewers around the world, included among others:

- Club speed
- Ball speed
- Ball launch direction (both vertical and horizontal)
- Ball launch spin
- Carry distance and dispersion
- Full trajectory information

## The Sample Size

Over 900 tee shots were recorded on Holes 6 and 10 by TrackMan™ during the championship rounds (1-4). Generally, players making the cut recorded eight tee shots, whilst players missing the cut recorded four. Some players have more than four or eight shots recorded due to Provisional Shots, Lost Ball, and/or

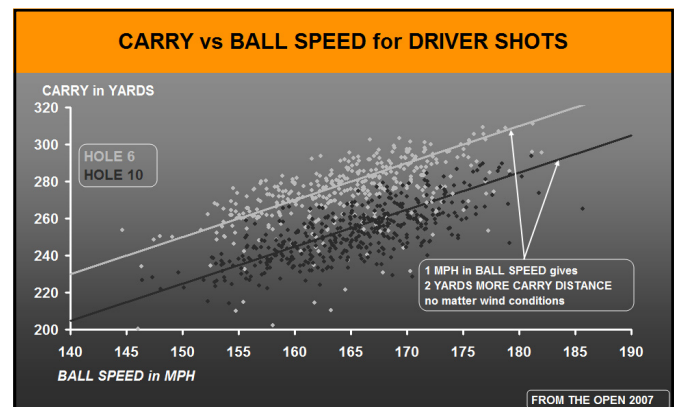
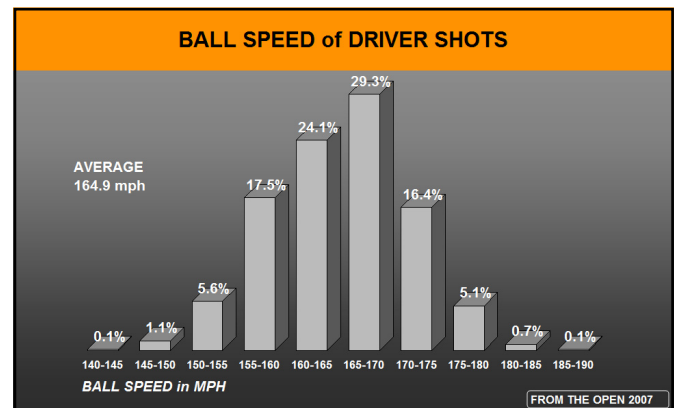
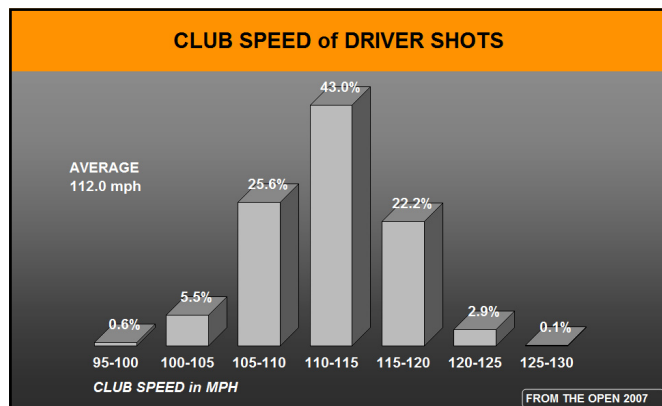
Out of Bounds. Generally, players hit their driver, but many of the competitors hit an iron or fairway wood at least once. Below, some of the TrackMan™ data are presented.

## Field Statistics - Launch Parameters:

	CLUB SPEED [mph]	BALL SPEED [mph]	LAUNCH ANGLE [deg]	SPIN RATE [rpm]
Lowest	98.6	146.0	1.4	1 564
Average	112.0	164.9	10.3	2 657
Highest	126.2	185.7	19.1	4 253

## Field Statistics - Carry:

- The average carry distance recorded with a Driver on Hole 6 was 274 yards.
- The average carry distance recorded with a Driver on Hole 10 was 252 yards.
- The average carry distance recorded with a Driver (Hole 6 & Hole 10) was 262 yards.
- The Top 41 carry distances were all recorded on Hole 6, where prevailing wind conditions were much more favourable during the tournament than those on Hole 10.

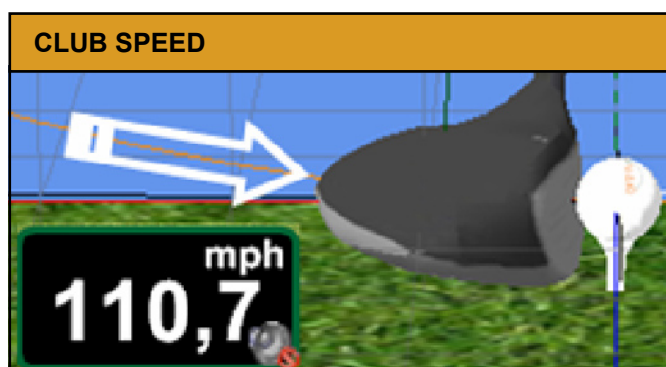




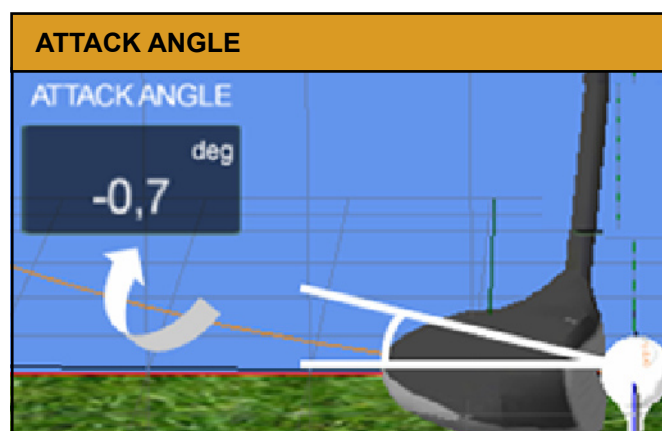
## TrackMan™ Club Delivery Data - A Graphic Explanation

With the release 3.0 of TrackMan™ earlier this year, six new club delivery data parameters – attack angle, dynamic loft, club path, face angle, vertical swing plane and horizontal swing plane – joined club speed and completed existing state-of-the-art measurement parameters of TrackMan™ (ball speed, launch angles, spin rate, spin axis and full trajectory). With more radar science coming your way through the process, this is an attempt to illustrate the meaning and importance of club delivery data.

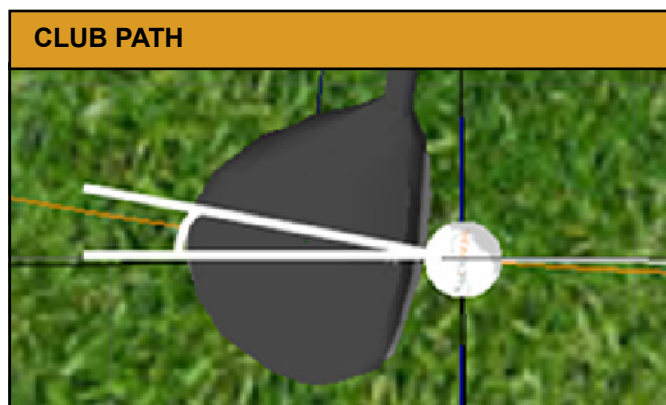
In recent years, the focus of the golf industry has to a high degree been on ball data measurement. TrackMan™ has now taken the technological analysis a step further, developing an understanding of ball data values through club delivery data analysis. Of the 6 new club delivery data parameters in the release 3.0 of TrackMan™, club path and attack angle are of particular importance. While club path is an essential parameter for instruction, measuring the attack angle is a key parameter in club fitting.



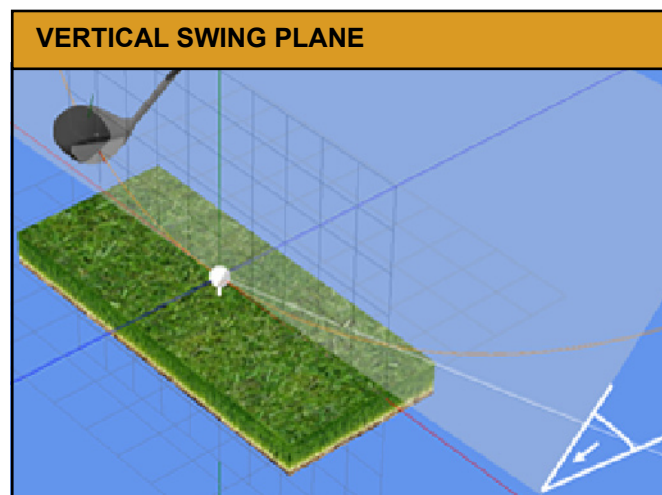
Club speed measured just before impact.



The angle with which the club head is “attacking” the ball just before impact - measured in relation to ground level.



The club head path measured at impact. Positive value if the club head is moving to the right (inside/out for right handed player) and negative value is a club head moving to the left through impact.

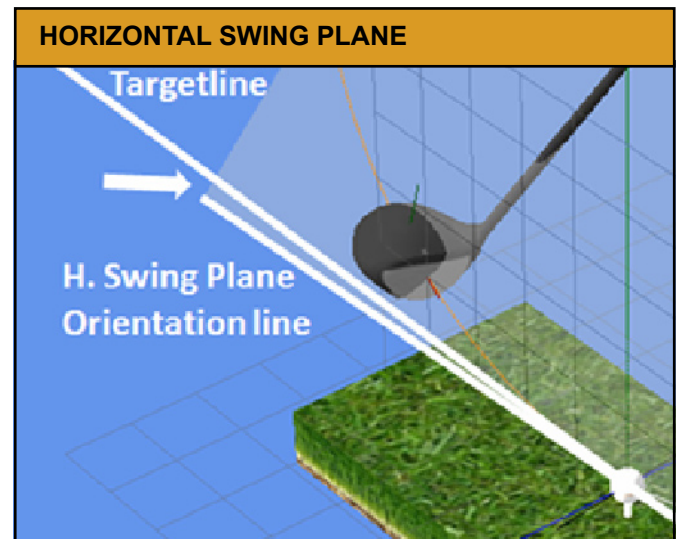


The angle of the swing plane of the club head - seen from the ground and up.

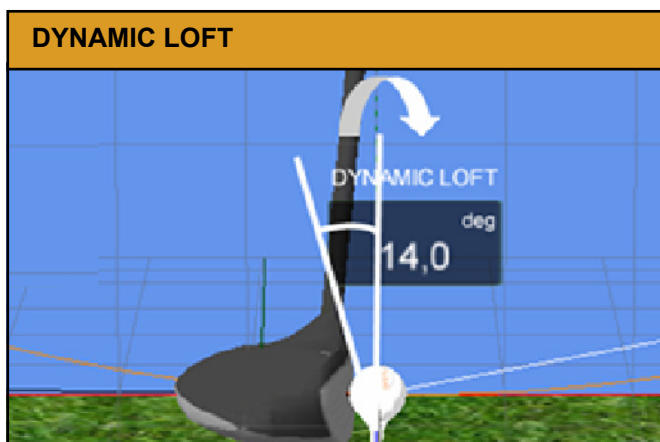
## TrackMan™ Club Delivery Data - A Graphic Explanation (continued)

The 7 club delivery data parameters will together with ball data improve conditions for instruction, player practice, club fitting and other areas significantly. The new parameters will enable players at all levels to analyse their shots more deeply in order to pinpoint flaws and inefficiency in their club delivery.

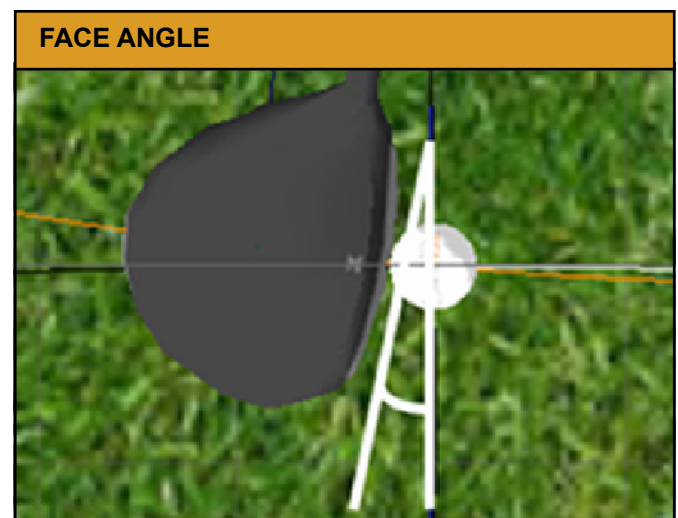
“This set of club delivery data is unique for TrackMan™, and it has been very well received. We have worked hard to obtain club delivery data with the greatest accuracy. We will keep developing new applications such as Driver Fitting that take advantage of the club delivery data to assist our customers in the best possible way”, says Fredrik Tuxen, CTO at ISG.



The swing plane of the club head - seen from above. Orientation left/right measured in relation to the target line.



The dynamic or effective loft of the club at the point of impact of the ball on the club face - calculated relative to vertical.



The club head angle at the point of impact of the ball on the club face relative to target line. Positive value if the club head is open at impact. Note that the face angle depends on where on the club face the ball is impacted due to bulge radius for woods.

## TrackMan™ Strengthens Position In US College Golf

**Louisiana State University (LSU) and East Tennessee State University (ETSU) have selected the TrackMan™ technology to enhance their golf training facilities and player development programs. LSU and ETSU hereby join a growing list of major college golf teams, including the reigning Men's and Women's NCAA Division I National Champions, to integrate TrackMan™ into their golf programs.**

As mentioned elsewhere in this newsletter, TrackMan™ is present on many big golf scenes such as the US Open, The Open Championship and PGA TOUR/LPGA Tour events. Yet, it is of equal importance to work with the future stars of the game and help them develop their golf skills to a maximum degree.

"Discussions with Stanford coach, Conrad Ray, about their use of TrackMan™ last year, gave me a good feeling that this ground-breaking technology could be a valuable asset to the LSU Golf Program. Now that the system is implemented here at our golf training facility, we see the great potential the technology offers our golf athletes, for instance in distance control training. TrackMan™ will be a major part of the LSU Golf player development programs for the coming years", said LSU golf coach, Chuck Winstead.

Collegiate golf programs use TrackMan™ technology for self-practice, benchmarking, instruction (club delivery data), club fitting, gap fitting and other activities.

"We are proud that LSU and ETSU have selected TrackMan™ as a key element in their future golf programs. We are confident that TrackMan™ will contribute significantly to their development of competitive players and strengthen their results in collegiate golf. Furthermore, we are very pleased to see an increasing interest around TrackMan™ in US college golf as competing universities discuss the value that our future-proof technology can add to their golf programs", said Klaus Eldrup Jorgensen, President of ISG.

“ Now that the system is implemented here at our golf training facility, we see the great potential the technology offers our golf athletes, for instance in distance control training. ”



**Chuck Winstead**  
LSU Golf Coach



## Recipe For A Hole-in-One

In May 2006 during the BMW Championship at Wentworth, Luke Donald hit the shot with the below data on the 146 yards par three second hole. His 7 iron draw made the ball pitch to about eight feet behind the hole, and then spun back into the cup. Unfortunately for Luke, no special prize was on offer for a hole-in-one on hole #2. Luke's ace was hit on the wrong hole for a prize - but in TrackMan's view, it was hit on the right hole.

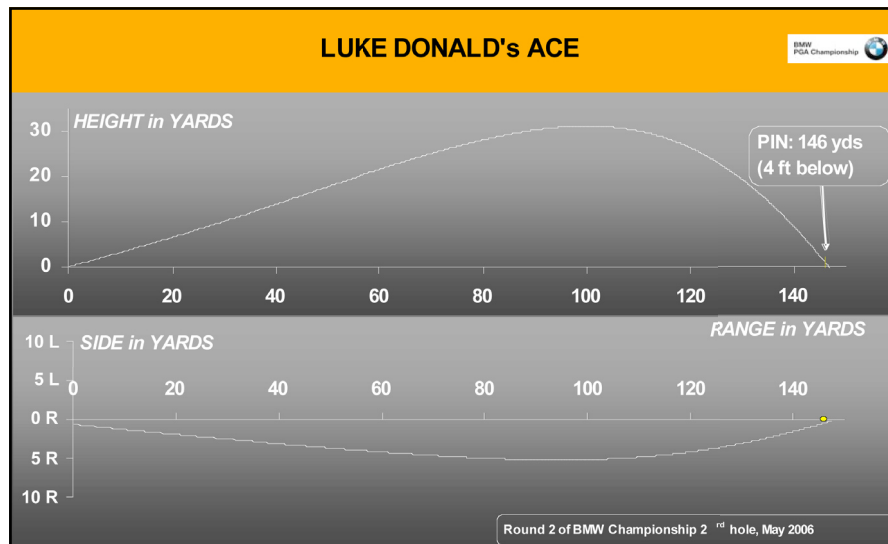
"It was a nice shot, even if I do say so myself - just a little punch, with the wind right-to-left. I've had six or seven playing socially but it was my first ace in a tournament", Donald said on Mizuno's website.

Donald did not win the tournament as his countryman, David Howell, prevailed. Yet, it was Donald's first hole-in-one on the European Tour and his Wentworth ace remains well preserved in TrackMan's data archives.



“ It was a nice shot, even if I do say so myself - just a little punch, with the wind right-to-left. ”

**Luke Donald**



Luke used his 7 iron and started the ball 11 m right of the flag but with an intentional draw.

The ball carried 8 ft past and 10 inches to the right of the flag.

Because of the relative steep landing of 55° and a landing spinrate of 6086 rpm, the ball pitched and rolled backwards into the cup!

LAUNCH		APEX		LANDING	
CLUB SPEED	87.3 mph	RANGE	99.9 yds	CARRY	148.7 yds
BALL SPEED	116.8 mph	HEIGHT	31.1 yds	SIDE	10R in
VERT. LAUNCH	16.1 deg	SIDE	5.2R yds	LAND. ANGLE	55.1 deg
HORIZ. LAUNCH	4.7R deg			LAND. SPEED	53.4 mph
SPIN RATE	7667 rpm			LAND. SPIN	6086 rpm
SPIN AXIS	-5.0° (draw)			FLIGHT TIME	6.09 s