A Review of Driving Distance - 2015

Introduction

The purpose of the Joint Statement of Principles (issued in May 2002) was to set out the joint views of the R&A and the USGA, together with the framework of key principles and policies to guide their actions in relation to equipment and equipment regulation. Since that time, The R&A and the USGA have continued to monitor closely the effects of advancing equipment technology on the playing of the game and new equipment Rules have been introduced throughout this period, when appropriate. This report notes that changes in scoring average have been steady and includes a review of data associated with driving distance on the world's major golf tours compiled at the conclusion of their respective 2015 seasons.

This report examines driving distance on the major professional golf tours. The data contained herein is from the PGA TOUR, European Tour, Japan Golf Tour, Web.com Tour, PGA TOUR Champions Tour, LPGA Tour and Ladies European Tour going back as far as data are available. A more focused picture is subsequently given of distance since 2003[1] with particular attention to the PGA TOUR (where Shotlink data provides additional insight), and the European Tour.

The average driving distance is typically measured on two holes at each tournament and can result in nearly 40,000 shots being measured over the course of a season on some tours. The vast majority of players on the PGA TOUR (94%) and European Tour (97%) use driver on the holes used for measuring driving distance regardless of their driving distance rank.

A comparison of these major professional tours, both men's and women's, indicates that for the PGA, European, Web.com and Champions tours, the average driving distance has increased by approximately 1% since 2003 until the end of the 2015 season. This increase is characterised by a slow "creep" in drive distance over this period of around 0.2 yards per year. The average driving distances on the Japan Golf Tour, LPGA Tour and Ladies European Tour decreased by a similar amount (~1%) over the same time period.

Since 2003, variability in season to season driving distance of 4 or more yards is not uncommon.
The largest overall increase in driving distance has taken place on the Web.com Tour which was 5 yards longer in 2015 than it was in 2003.

The average driving distance of the longest (and shortest) players on the European and PGA tours closely tracks the respective tour average driving distances, including the season-to-season fluctuations. When viewed as percentages, there is good consistency both between tours and seasons. The longest 10 players tend to be about 7% longer than the tour average whereas the shortest 10 players tend to be about 6% shorter than the tour average.

In 2015, the average clubhead speed was 113.2 mph, with an average launch angle of 10.8° and average spin of 2599 rpm. The 90th percentile for clubhead speed was 119.2 mph. These values are very close to the test conditions for the Overall Distance Standard (launch angle of 10°, backspin of 2520 rpm and a clubhead speed of 120mph) which regulates ball distance.

[1] The USGA/R&A Joint Statement of Principles was adopted in May, 2002. The PGA TOUR issued their Position on Equipment in July, 2003 and committed to partner with the USGA and R&A on equipment matters. Both the Joint Statement and PGA TOUR Summary Position on Equipment are attached for reference. As a result of the adoption of these positions by mid-2003, the 2003 season was chosen as the benchmark season for drive distance at the highest level.

Background

In May 2002 the USGA/R&A adopted a Joint Statement of Principles. The purpose of this statement was to set out the joint views of the R&A and the USGA, together with the framework of key principles and policies which guide their actions pertaining to equipment.

History has proven that it is impossible to foresee the developments in golf equipment which advancing technology will deliver. It is of the greatest importance to golf's continuing appeal that such advances are judged against a clear and broadly accepted series of principles. While generally welcoming this progress, with the adoption of the Joint Statement of Principles, the R&A and the USGA committed to remaining vigilant when considering equipment Rules to protect golf's best traditions, to prevent an over-reliance on technological advances rather than skill, and to ensure that skill is the dominant element of success throughout the game. The PGA TOUR issued its Position on Equipment in July, 2003 and committed to partner with the USGA and R&A on equipment matters. Both the Joint Statement and PGA TOUR Summary Position on Equipment are attached for reference

As the governing authorities for the Rules of Golf including equipment Rules, R&A Rules Ltd (the "R&A") and the United States Golf Association (the "USGA") have continued to monitor closely the effects of advancing equipment technology on the playing of the game. Furthermore, new equipment Rules have been introduced throughout this period, when appropriate, including restrictions on the performance and dimensions of clubs and refinement of the testing methodology utilized for testing golf balls to ensure that it is representative of the equipment used by and performance of elite golfers, Figures 1 and 2.

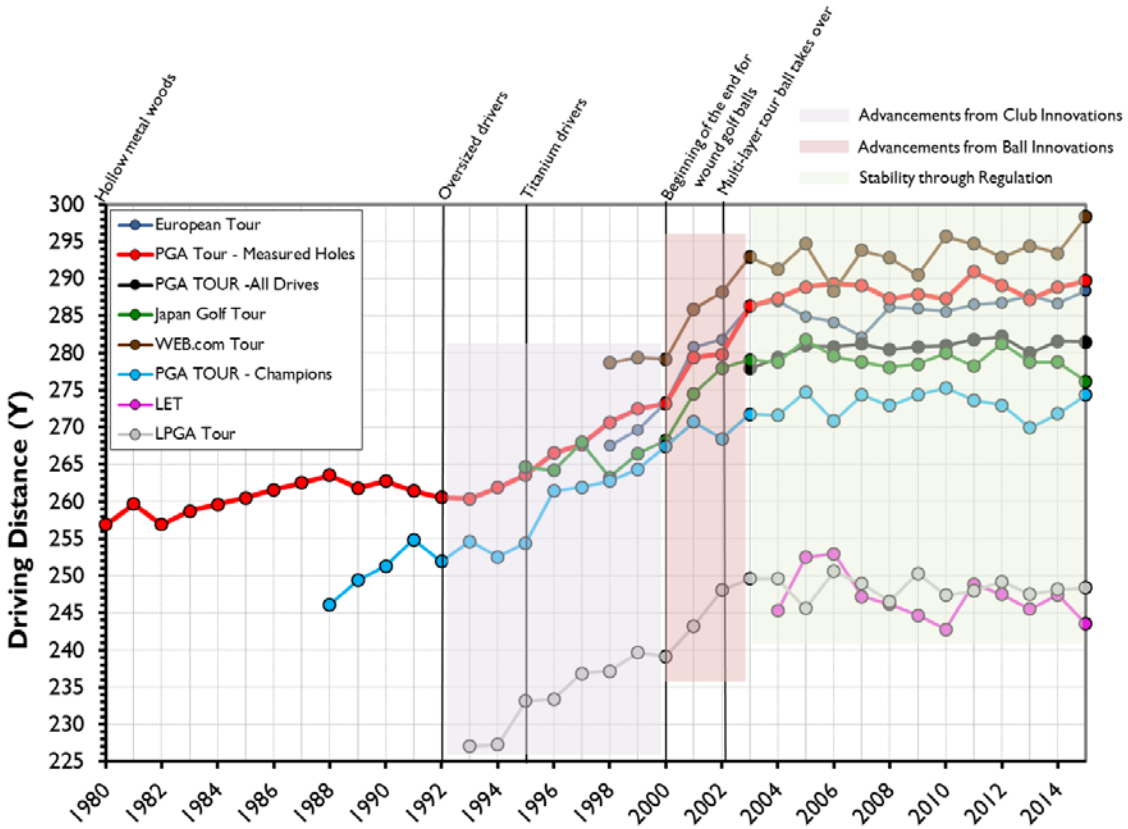

Figure 1. Average driving distance on the major tours with significant innovation milestones overlaid

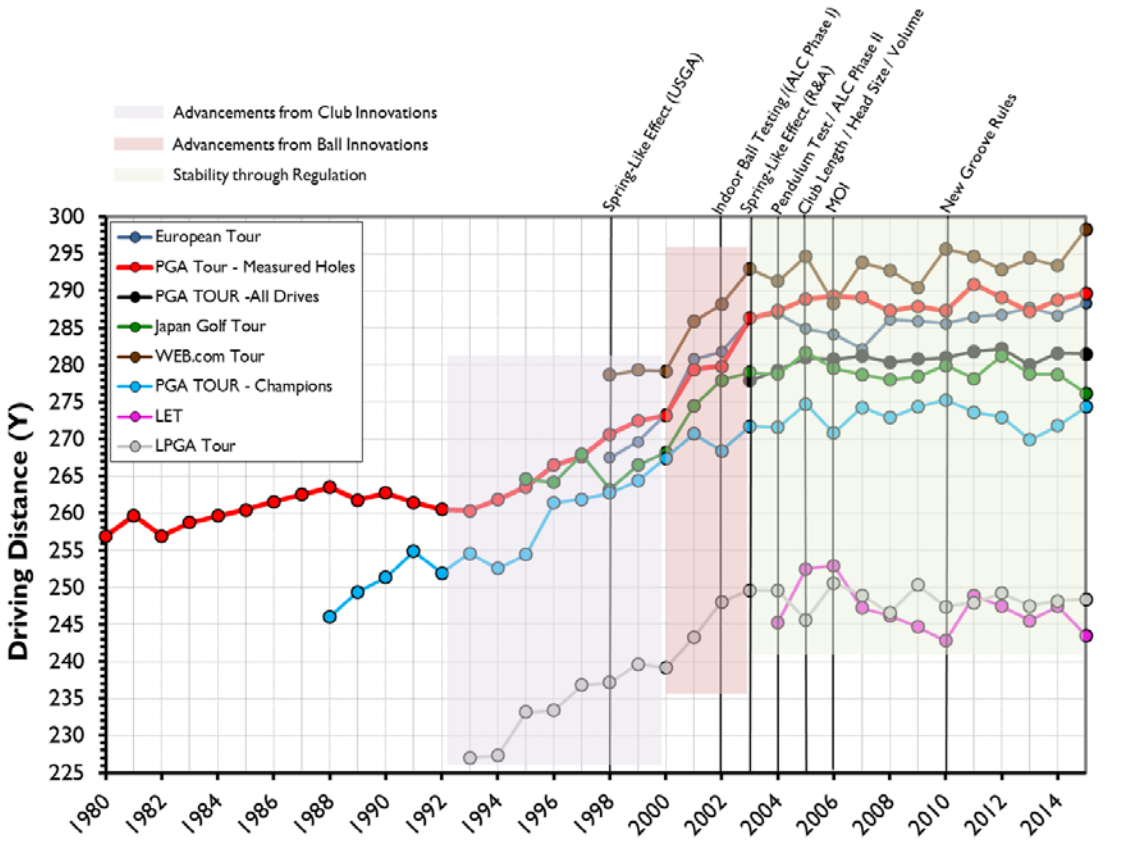

Figure 2. Average driving distance on the major tours with significant Rule change milestones overlaid

The R&A and the USGA are also aware that this subject has attracted wide-ranging comment and a number of conflicting views, even though changes in scoring average have been steady, characterised by a slow "creep" downward over this period of around 0.04 strokes per year across all of the tours over the timescale for which data have been available, Figure 3.

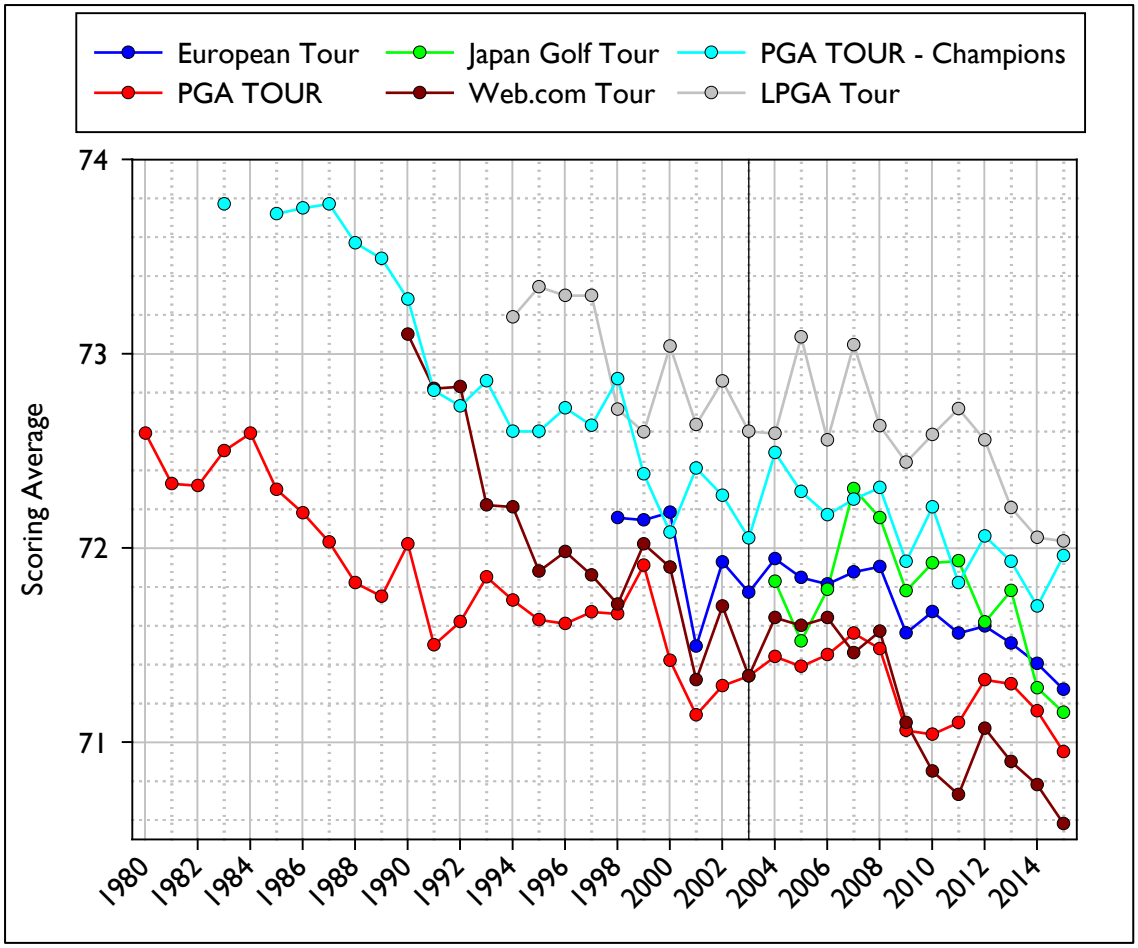

Figure 3. Scoring average on all tours. Note: the data utilized for the PGA TOUR and Japan Golf Tour are the actual scoring average values which are not normalized by the performance of the field.

This report includes a review of data associated with driving distance on the world's major golf tours compiled at the conclusion of their respective 2015 seasons. This is compared to historical values where they are available. A more focused picture is subsequently given of distance since 2003 with particular attention on the PGA TOUR, where Shotlink data provides additional insight, and the European Tour.

Definition of Driving Distance and Methodology of Data Collection

It is important to define the data which form the basis of this report. The driving distance is the total distance measured from the teeing ground to the point where ball comes to rest – regardless of the location (fairway, rough, bunker, putting green etc.) These data are collected on the major tours using one of two methods:

1. Tournament officials will measure incremental distances from the teeing ground which are then marked on both edges of the fairway of the hole(s) being used for the collection of data. These distance marks are then used by the player, caddie or volunteer collecting the data to determine the distance for a given drive.

2. A combination of GPS and laser measuring equipment is used to directly measure the distance of each drive on a hole.

Driving distance data are typically collected on two holes ("measured" drive holes), which are selected taking into account three criteria:

1. The holes should be oriented in opposing directions (to minimise the impact of the wind on the average distance).

2. The holes should preferably both be selected such that the landing area for the drives is flat. Where this is not feasible, the holes would preferably have opposing topography to minimise the effect of slopes on the average driving distance.

3. The holes should be selected to maximise the potential that the golfers will choose to hit their driver (ensuring that the data most closely reflects the distance hit by players using drivers).

The PGA TOUR introduced the Shotlink system in 2003 which is used at most of its tournaments. This system measures every shot during a tournament which means that, in addition to the traditional "measured" driving distance on two holes, data are also available for all other par 4 and par 5 holes.

The PGA TOUR, Web.com Tour and PGA TOUR Champions Tour calculate the average driving distance based on all available shots by all players competing in their events. However, only the players who have played a predefined number of qualifying rounds are included for presentation in the end of season summary statistics. In recent years a player would typically need to play 50 rounds on the PGA TOUR, 35 rounds on the Web.com Tour or between 35 and 40 rounds on the PGA TOUR Champions Tour for inclusion in the end of season summary statistics.

The European Tour only collect data for full members of the tour and subsequently only players who have played 10 or more rounds will be included for presentation in the end of season summary statistics.

The Ladies European Tour typically collects data for only full members of the tour, although the data for non-members who fill in a stats card may be included within the raw data.

The LPGA reports data only for players who over the course of a season have participated in a minimum of 10 events or 1/3 of the total number of official events, whichever is fewer.

Driving Distance – All Years

The average driving distance for each year that data have been collected on the major tours for which data are available are shown in Figure 4. The average driving distance from all measured Par 4 and Par 5 holes for the PGA TOUR and is also included for comparison.

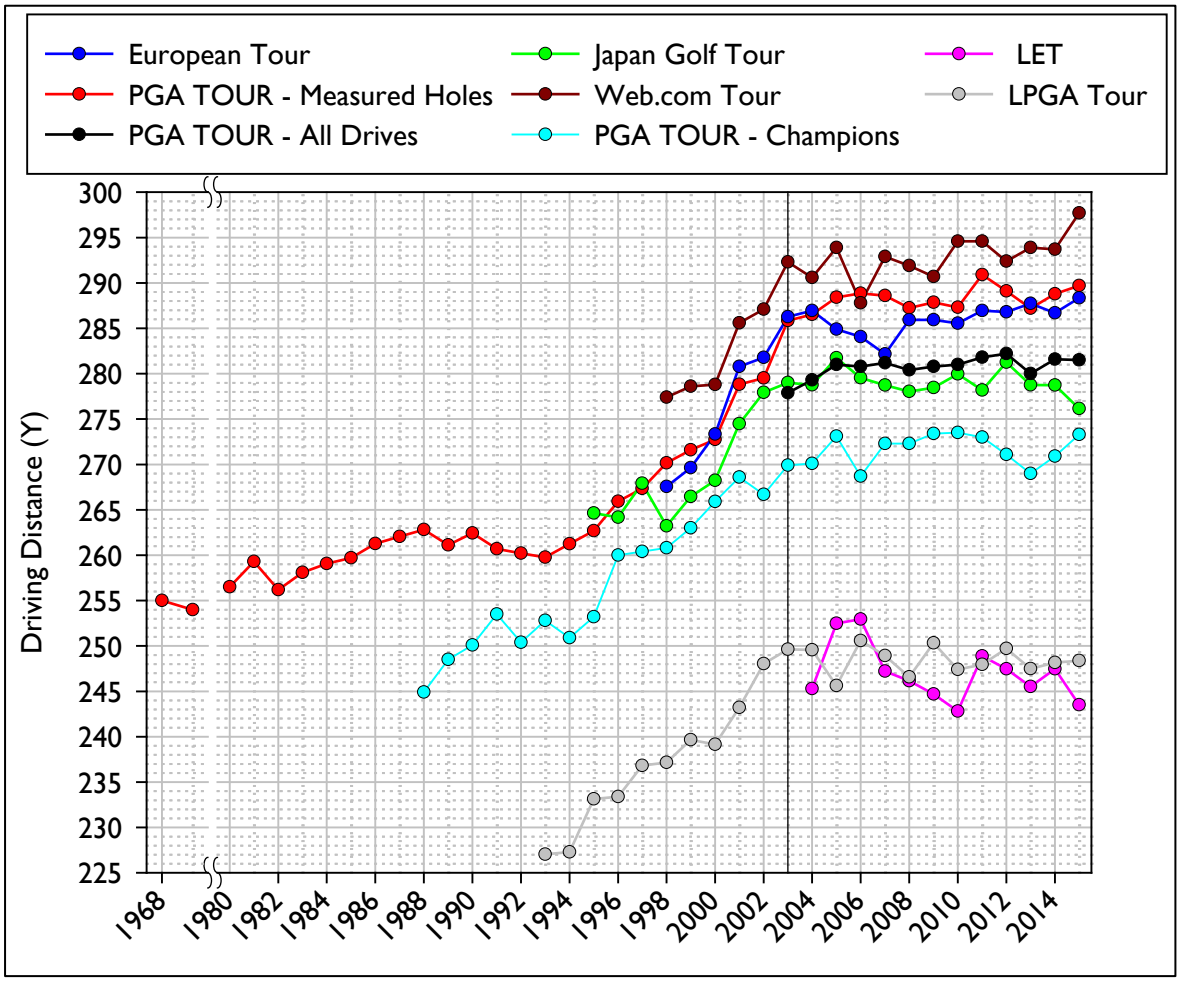

Figure *4*. Average driving distance on the major tours

The USGA/R&A Joint Statement of Principles was adopted in May, 2002. The PGA TOUR issued its Position on Equipment in July, 2003 and committed to partner with the USGA and R&A on equipment matters. Both the Joint Statement and PGA TOUR Summary Position on Equipment are attached for reference. As a result of the adoption of these positions by mid-2003, the 2003 season was chosen as the benchmark season for driving distance at the highest level.

Driving Distance – Since 2003

The average driving distances measured on the major tours for all complete seasons since 2003 is shown in Figure 5.

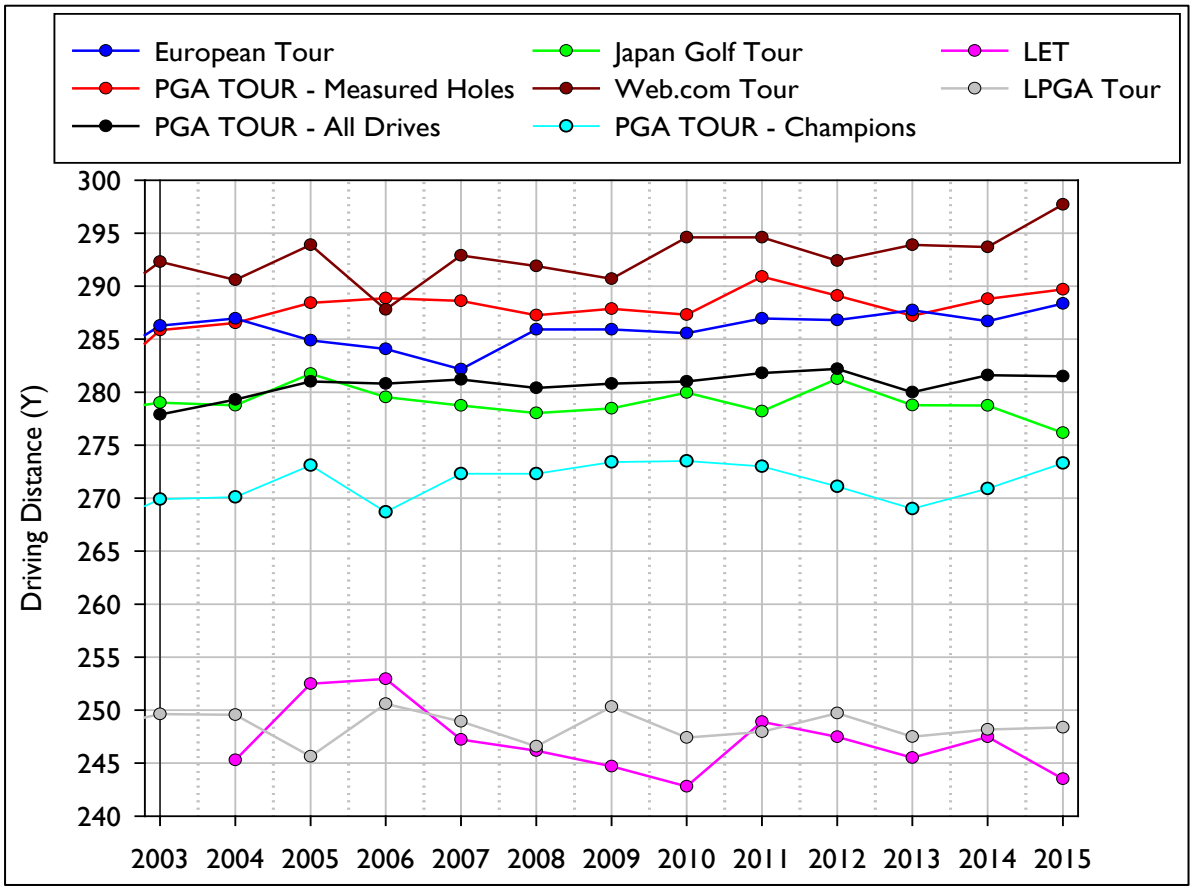

Figure 5. Average driving distance on the major tours since the first full season after the publication of the Joint Statement of Principles.

A comparison of the end of season distance averages for 2015 to those from the 2003 season are presented in Table 1 (Note: the 2004 season is used for the Ladies European Tour as the first season for which data are presented by the tour). The data indicates that there have been increases in driving distance on four of the monitored tours and decreases in the other three. It should be noted that the data do exhibit season-to-season fluctuation and the range of average driving distances observed since 2003 is greater on all tours than the difference between the 2003 and 2015 average distances.

Table 1. Comparing the 2015 driving average data to the 2003 season. Note: The 2004 season is used as the comparison point for the Ladies European Tour. Where raw data are available, the standard error in the mean has been calculated and included.

	2003	2015	Change (Yards)	Change (%)	Range (Yards since 2003)	Magnitude of range (Yards)
European Tour	286.3 ±0.15	288.4 ±0.15	+2.1	+0.7	282.2 – 288.4	6.2
PGA TOUR (Measured Holes)	285.9 ±0.12	289.7 ±0.13	+3.8	+1.3	285.9 – 290.9	5.0
PGA TOUR (All Holes)	277.9 ±0.06	281.5 ±0.06	+3.6	+1.3	277.9 – 282.2	4.3
Japan Golf Tour	279.0	276.2	-2.8	-1.0	276.2 – 281.7	5.6
Web.com Tour	292.3	297.7 ±0.19	+5.4	+1.8	287.8 – 297.7	9.9
PGA TOUR - Champions	269.9	273.3 ±0.23	+3.4	+1.3	268.7 – 273.5	4.8
LET (2004)	245.3	243.5	-1.8	-0.7	242.8 – 252.9	10.1
LPGA Tour	249.6	248.4	-1.2	-0.5	245.6 – 250.6	5.0

Driving Distance – Distance of the Longest & Shortest 10, 20, & 50 relative to the Average Driving Distance on the PGA TOUR

The average driving distances of the 10, 20 and 50 longest and shortest players who qualify for inclusion in the end of season statistics on the European and PGA tours are plotted in Figure 6 along with the average driving distance for each tour. The data for each of these groups of players tracks the trends and annual fluctuations observed for the average on each tour.

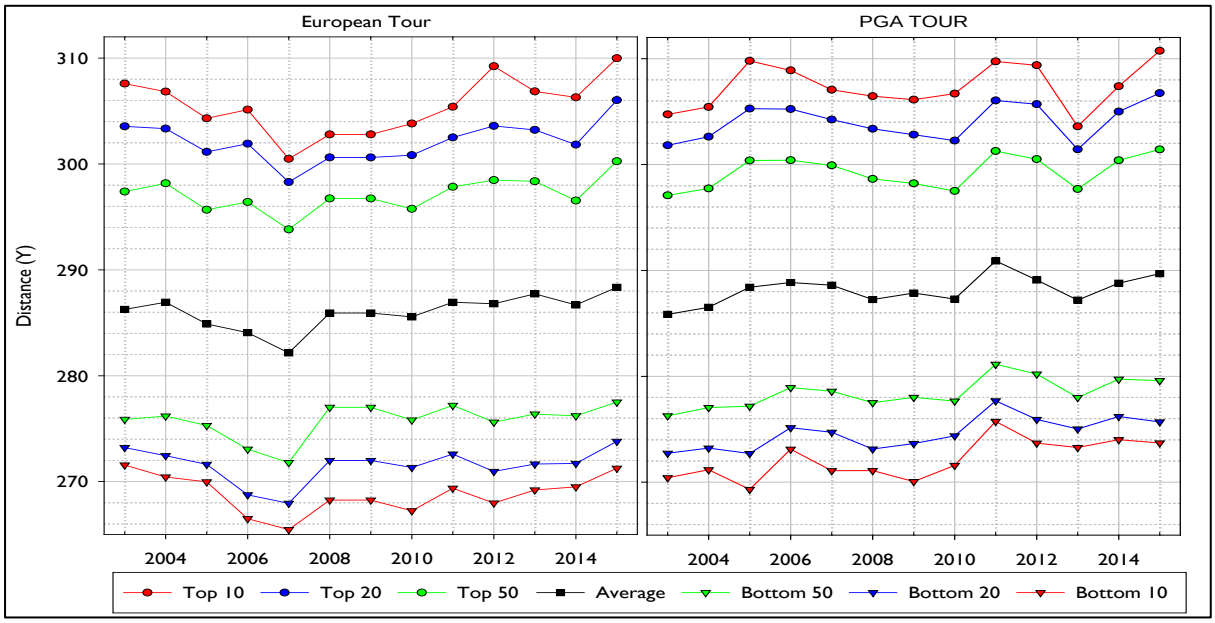

Figure 6. The average driving distance of the 10, 20, 50 and 100 longest players on the European and PGA tours along with the respective average driving distance on each tour.

The distance changes as the percentage increase over the average are presented in Figure 7. Once again the data demonstrate consistency both between seasons and tours; the longest 10 players tend to be around 7% longer than the tour average while the shortest 10 players are generally around 6% shorter than the tour average.

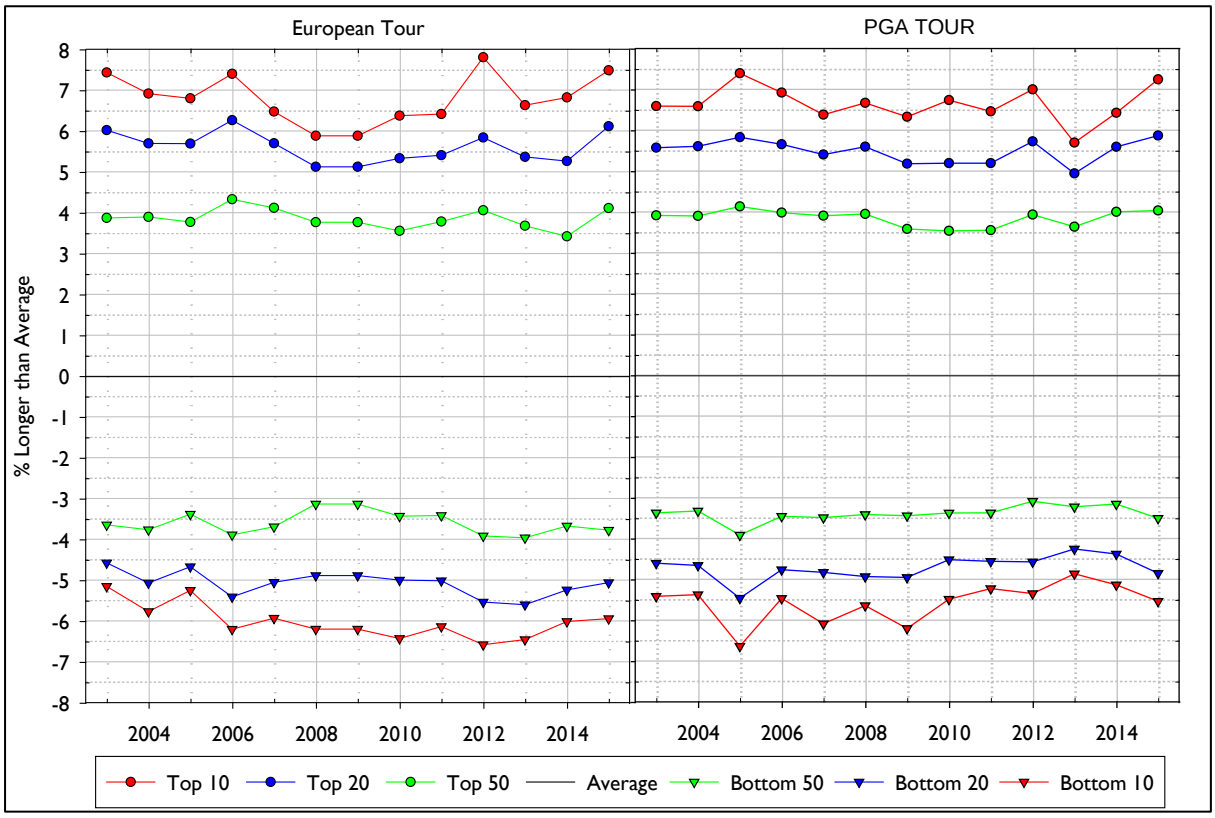

Figure 7. The percentage difference in the average driving distance of the longest and shortest 10, 20 and 50 players on the European and PGA tours relative to the respective tour averages.

Driving Distance – Distribution of driving distances on the European and PGA tours

The distribution of the length of drives on the "measured" driving holes on the European and PGA Tours in 2003 and 2015 are presented in Figure 8 and Figure 9 respectively. These data from both tours during both seasons show very similar, normal distributions.

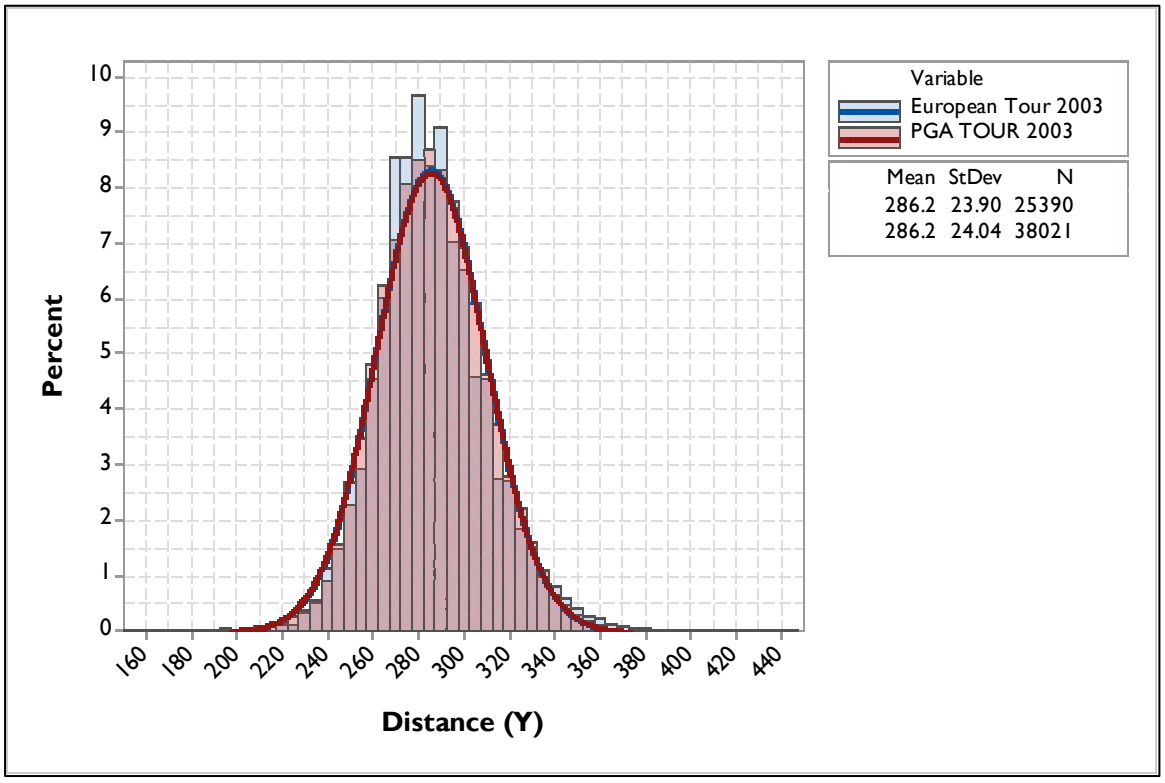

Figure 8. The distribution of distances on "measured" driving holes on the European and PGA TOUR in 2003.

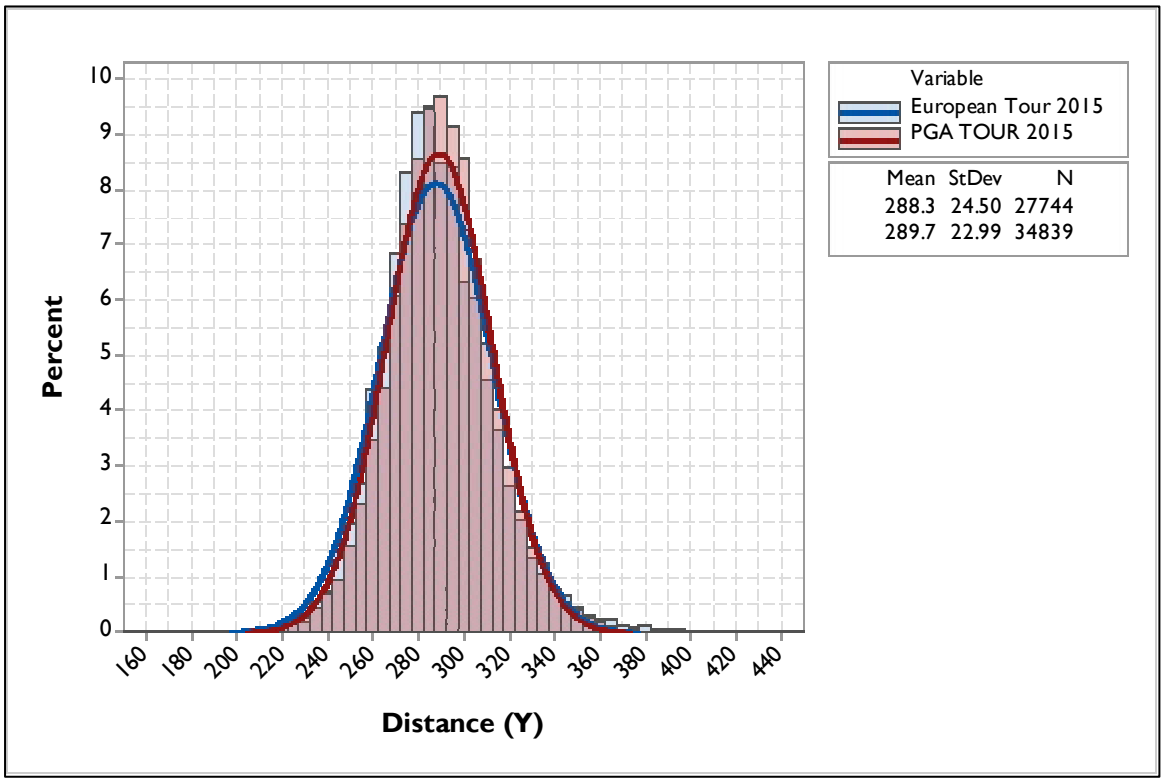

Figure 9. The distribution of distances of "measured" driving holes on the European and PGA TOUR in 2015.

The lengths of drives on the "measured" driving holes since 2003 on the European and PGA tours have been placed in 20 yard distance bands between 240 and 320 yards (with additional bands representing all drives over 320 yards and all drives shorter than 240 yards) These data are presented in Figure 10 and Table 2 & Table 3 (for the European and PGA tours respectively). The percentage of shots in each band have remained generally similar for the European Tour whereas the PGA TOUR has seen a small decrease (approximately 3%) in the percentage of shots in the 240-260 and 260-280 bands and an increase of 5% in the 280-300 yard band.

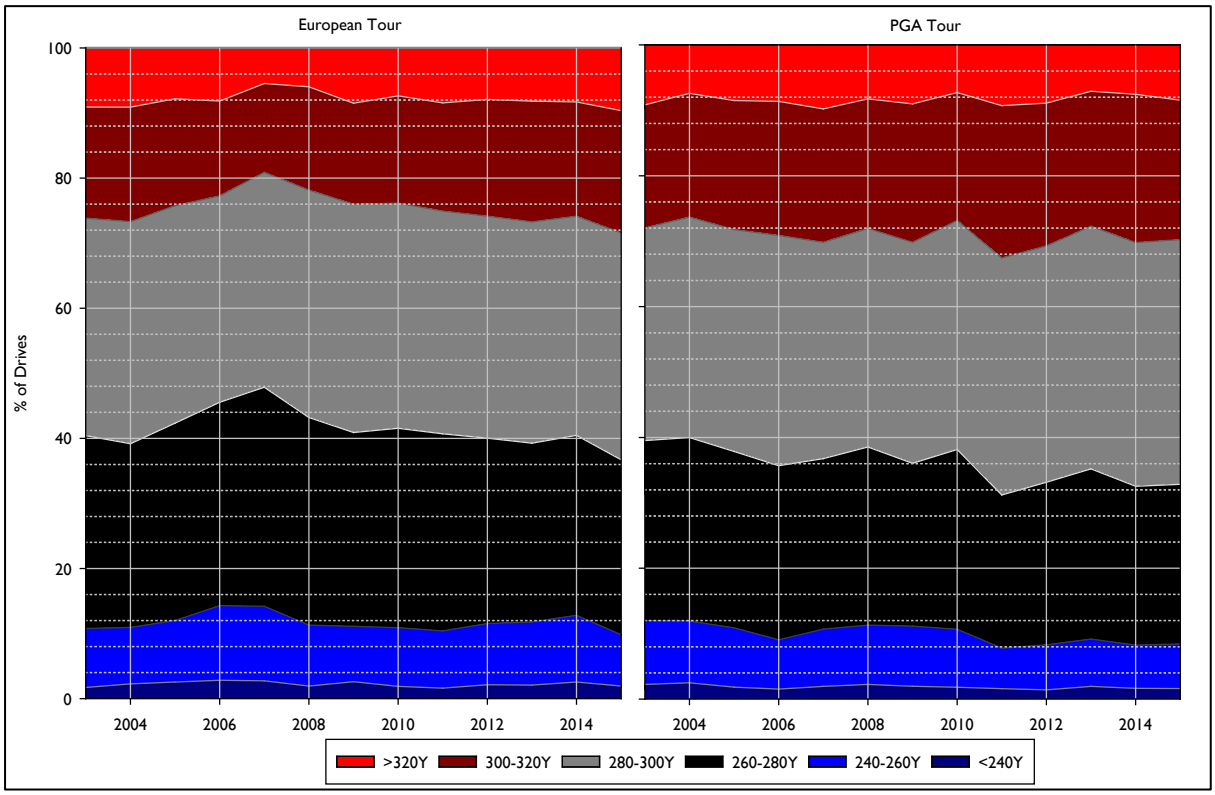

Figure 10. The distribution of drives on "measured" driving holes on the European and PGA tours 2003-2015.

Table 2. The distribution of drives on "measured" driving holes on the European Tour 2003-2015.

	≤240Y	240-260Y	260-280Y	280-300Y	300-320Y	≥320Y
2003	1.38%	9.06%	29.64%	33.44%	17.07%	9.07%
2004	1.62%	8.67%	28.26%	34.13%	17.59%	9.08%
2005	1.99%	9.46%	30.35%	33.41%	16.44%	7.81%
2006	2.39%	11.47%	31.26%	31.72%	14.56%	8.16%
2007	2.3%	11.44%	33.68%	33.02%	13.66%	5.45%
2008	1.43%	9.37%	31.93%	34.94%	15.88%	5.96%
2009	2.15%	8.5%	29.81%	35.08%	15.53%	8.48%
2010	1.56%	9%	30.67%	34.6%	16.48%	7.36%
2011	1.18%	8.8%	30.29%	34.24%	16.62%	8.43%
2012	1.46%	9.4%	28.51%	34.12%	17.93%	7.91%
2013	1.64%	9.69%	27.5%	34.01%	18.54%	8.17%
2014	1.99%	10.26%	27.67%	33.67%	17.57%	8.28%
2015	1.48%	7.87%	26.91%	34.86%	18.8%	9.62%

Table 3. The distribution of measured drives on driving holes on the PGA TOUR 2003-2015.

	≤240Y	240-260Y	260-280Y	280-300Y	300-320Y	≥320Y
2003	2.24%	9.76%	27.53%	32.52%	18.79%	7.77%
2004	2.48%	9.44%	28.07%	33.70%	18.91%	7.36%
2005	1.82%	9.06%	26.98%	33.92%	19.73%	8.47%
2006	1.52%	7.53%	26.63%	35.20%	20.50%	8.61%
2007	1.93%	8.75%	26.08%	33.07%	20.39%	9.78%
2008	2.23%	9.07%	27.24%	33.40%	19.81%	8.26%
2009	1.95%	9.21%	24.90%	33.77%	21.17%	8.99%
2010	1.81%	8.86%	27.49%	35.01%	19.55%	7.27%
2011	1.59%	6.18%	23.44%	36.23%	23.29%	9.28%
2012	1.41%	6.89%	24.86%	36.12%	21.83%	8.89%
2013	1.93%	7.24%	26.04%	37.08%	20.64%	7.08%
2014	1.64%	6.60%	24.31%	37.25%	22.65%	7.54%
2015	1.60%	6.83%	24.41%	37.41%	21.31%	7.63%

Driving Distance - Driver Usage

Driver usage statistics have been collected by the PGA TOUR as part of the Shotlink system since 2012. These data are recorded at all tournaments which collect full Shotlink data. Positive identification of the club used from the teeing ground (as driver or not driver) was made for 85% of the 35,000 shots which make up the "measured" driving distance statistic on the PGA TOUR in 2015. When considering the average driver usage for "all" drives (par 3s excluded), positive identification of the club used from the tee was achieved for over 90% of the 210,000 shots in 2015. Similar driver usage statistics have been collected by the European Tour on driving holes. These data from both tours are presented in Table 4.

It can be seen that on the PGA TOUR in 2015, over 94% of drives on "measured" driving holes (where the club has been positively identified) were with driver while the equivalent value for the European Tour is nearly 98%. These very high values indicate that the average drive distances presented by the tours are a good indicator of the average distance achieved by the players when using driver. When considering "all" drives on the PGA TOUR, nearly 72% of tee shots were with driver (where the club used was positively identified). It is interesting to note that the average driving distance when considering only shots hit using a driver is similar whether considering driving holes or non-driving holes.

Table 4. Club usage on the European and PGA tours.

		2012	2013	2014	2015
PGA TOUR "Measured" Driving Holes	% Driver Usage	93.3	93.6	94.2	94.2
	Distance - All drives (Y)	290.2	288.1	289.3	289.8
	Distance - Drivers (Y)	290.9	289.2	290.0	290.6
PGA TOUR Non-Driving Holes	% Driver Usage	67.8	67.0	67.0	67.9
	Distance - All drives (Y)	280.9	278.9	280.2	280.3
	Distance - Drivers (Y)	289.5	287.5	288.8	288.8
PGA TOUR "All" Holes	% Driver Usage	71.7	71.0	71.2	71.9
	Distance - All drives (Y)	282.3	280.3	281.6	281.8
	Distance - Drivers (Y)	289.7	287.8	289.1	289.2
European Tour Driving Holes	% Driver Usage	96.2	96.7	96.0	97.7

Driving Distance - Driver Usage by distance rank on the PGA TOUR

The percentage driver usage (both for driving holes and for all Par 4s and 5s) for the individual players who qualify for inclusion in the 2015 driving distance rankings on the PGA TOUR is presented in Figure 11. The majority of players use driver more than 90% of the time on the "measured" driving holes. In 2015, 26 players (approximately 14%) used a driver on these holes less than 90% of the time, and only 7 players (4% of the population) used driver less than 80% of the time on driving holes.

Not surprisingly there is a fairly strong correlation between percentage driver usage and driving distance rank when considering the percentage driver usage on all par 4s and 5s.

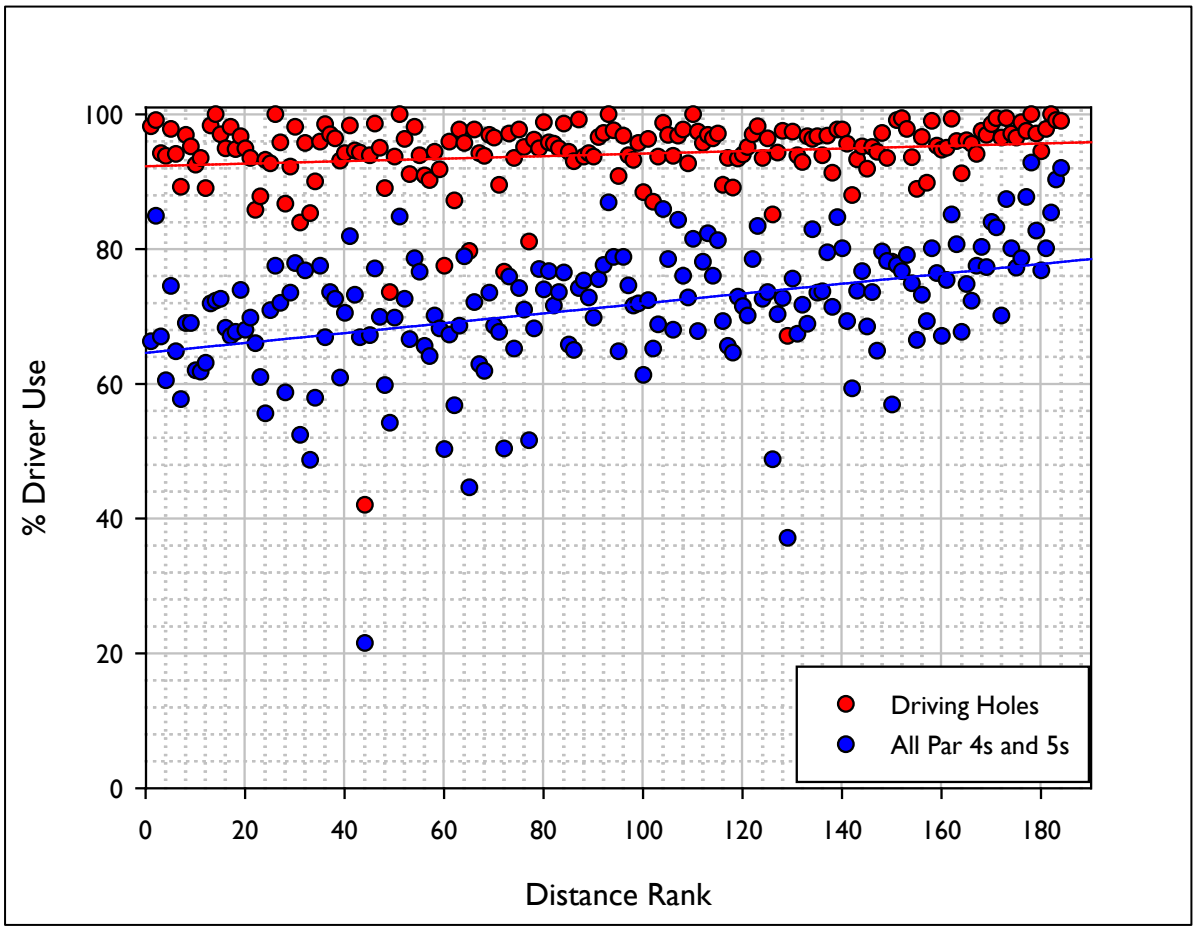

Figure 2. Percentage Driving distance vs distance rank on the PGA TOUR in 2015.

Driving Distance – Launch Conditions on the PGA TOUR

The PGA TOUR has used a TrackMan RADAR system to measure launch data at tournaments as part of the Shotlink system since 2007. Data are typically collected on one or two par 4 or par 5 holes at each tournament, although these holes are not always the "measured" driving holes (only 19 out of 55 holes on which RADAR data were reported in 2015 were "measured" driving holes). Since the introduction of logging club selection for tee shots in 2012, these launch data are only reported for shots hit with driver. In practical terms this results in the exclusion of approximately 500-600 shots each year (from a population of 12,000-16,000) and as such has only a very minor effect on the value of the average launch conditions.

The average launch conditions by year are shown in Table 5. It can be seen that average clubhead speed has increased by 0.8 mph from 2007 to 2015 and ball speed by 2.3 mph. Launch angle in 2015 is the same as the 2007 value, while spin is 215 rpm lower in 2015. It is also noteworthy that the launch condition set-up for the Overall Distance Standard is 10° and 2520 rpm at a clubhead speed of 120 mph.

Table 5. Launch Conditions measured on the PGA TOUR.

	2007	2008	2009	2010	2011	2012	2013	2014	2015
Clubhead Speed (mph)	112.4	112.3	111.7	112.6	112.8	113.0	113.2	113.0	113.2
90th Percentile Clubhead Speed (mph)	118.5	118.3	117.4	118.5	118.6	118.8	119.1	118.8	119.2
Ball Speed (mph)	165.4	165.2	165.2	166.2	166.8	167.2	167.4	167.2	167.7
Launch Angle (°)	10.8	11.3	11.3	10.7	10.8	10.9	10.9	11.0	10.8
Spin (RPM)	2814	2670	2670	2714	2667	2686	2639	2619	2599

Appendix

USGA/R&A JOINT STATEMENT OF PRINCIPLES

As the governing authorities for the Rules of Golf including equipment Rules, The Royal and Ancient Golf Club of St Andrews (the "R&A") and the United States Golf Association (the "USGA") have continued to monitor closely the effects of advancing equipment technology on the playing of the game. The R&A and the USGA are also aware that this subject has attracted wide-ranging comment and a number of conflicting views. History has proved that it is impossible to foresee the developments in golf equipment which advancing technology will deliver. It is of the greatest importance to golf's continuing appeal that such advances are judged against a clear and broadly accepted series of principles.

The purpose of this statement is to set out the joint views of the R&A and the USGA, together with the framework of key principles and policies which guides their actions.

In an historical context, the game has seen progressive developments in the clubs and balls available to golfers who, through almost six centuries, have sought to improve their playing performance and enjoyment.

While generally welcoming this progress, the R&A and the USGA will remain vigilant when considering equipment Rules. The purpose of the Rules is to protect golf's best traditions, to prevent an over-reliance on technological advances rather than skill, and to ensure that skill is the dominant element of success throughout the game.

The R&A and USGA continue to believe that the retention of a single set of rules for all players of the game, irrespective of ability, is one of golf's greatest strengths. The R&A and USGA regard the prospect of having permanent separate rules for elite competition as undesirable and have no current plans to create separate equipment rules for highly skilled players.

Golf balls used by the vast majority of highly skilled players today have largely reached the performance limits for initial velocity and overall distance which have been part of the Rules since 1976. The governing bodies believe that golf balls, when hit by highly skilled golfers, should not of themselves fly significantly further than they do today. In the current circumstances, the R&A and the USGA are not advocating that the Rules relating to golf ball specifications be changed other than to modernise test methods.

The R&A and the USGA believe, however, that any further significant increases in hitting distances at the highest level are undesirable. Whether these increases in distance emanate from advancing equipment technology, greater athleticism of players, improved player coaching, golf course conditioning or a combination of these or other factors, they will have the impact of seriously reducing the challenge of the game. The consequential lengthening or toughening of courses would be costly or impossible and would have a negative effect on increasingly important environmental and ecological issues. Pace of play would be slowed and playing costs would increase.

The R&A and the USGA will consider all of these factors contributing to distance on a regular basis. Should such a situation of meaningful increases in distances arise, the R&A and the USGA would feel it immediately necessary to seek ways of protecting the game.

In determining any future amendments to the Rules, or to associated procedures which may from time to time prove necessary, the R&A and the USGA will continue their respective policies of consultation with interested parties, including the use of notice and comment procedures, and will take account of the views expressed. The achievement and maintenance of worldwide uniformity in equipment rules through close co-ordination between the R&A and the USGA is a clear priority.

The R&A and the USGA are concerned that, on an increasing number of occasions, new products are being developed and marketed which potentially run counter to the principles expressed in this statement. These product launches, without prior consultation with the governing bodies, can lead

to considerable difficulties in formulating appropriate equipment rules and to undesirable conflicts between manufacturers and rule makers. The R&A and the USGA intend to bring forward proposals designed to improve procedures for the approval of new products.

The R&A and the USGA believe that the principles stated in this document will, when carefully applied, serve the best interests of the game of golf.

Summary of the PGA TOUR's position on equipment July 1, 2003

General Philosophy

Appropriate limitations on technology are essential to preserve the inherent value and popularity of the game of golf at the professional level.
PGA TOUR is committed to partner with the USGA and the R&A to:

- Conduct necessary research in the technology area;
- Develop appropriate equipment rules;
- Communicate to the media and the public the actions taken and results achieved;
- Monitor whether the equipment rules have achieved our intended purposes; and
- Modify the equipment rules and/or develop new rules, as appropriate

Proposed Rules Relating to Spring-Like Effect

- The TOUR supports the new Characteristic Time (CT) measurement method and Pendulum Tester
- Implementation of the Pendulum Tester on the PGA TOUR should occur by Jan. 1, 2004
- If the USGA fails to implement the Pendulum Tester by Jan. 1, 2004, the TOUR will consider adopting the CT measurement method and the Pendulum Tester for PGA TOUR competitions

Proposed Rules Relating to the Golf Ball

- The TOUR supports the Indoor Test Range (ITR) Phase II as currently proposed by the USGA
- The TOUR strongly urges the implementation of the ITR Phase II by no later than June 1, 2004

Monitoring, Communications and Research

I. Data Collection and Opinion Monitoring:

- The TOUR will partner with the USGA and R&A to collect relevant data, including but not limited to, golf ball distance, club selection, and swing speeds
- The TOUR will partner with the USGA and R&A to gauge media and public opinion relative to the effect of technology on professional golf

II. Communication:

- The TOUR will partner with the USGA and R&A to develop a variety of methods to communicate with the media and fans relative to equipment testing, equipment rules, and the impact of those rules on players' performance.

III. Further Rule Modifications:

- The TOUR will partner with the USGA and R&A relative to further rule modifications if golf ball distances continue to significantly increase or if general views of the game are negatively affected by technology (i.e., technology is more a factor in excellent performance than skill and athleticism).