

Clubhead Speed

1. Executive Summary

This document attempts to examine the historical and modern values of clubhead speed. Very little hard data of actual historical clubhead speed data exists. This is due in large part to the difficulty in making such measurements. Measurements were made using high speed motion pictures in both 1930 and 1957. These results appear consistent with modern radar measurements. Modern radar measurements also highlight a large difference in swing speed between male and female golfers, with the average male amateur golfer having swing speeds very near the LPGA average.

Contents

| | |
|------------------------------------|---|
| 1. Executive Summary..... | 1 |
| 2. Historical Measurement | 1 |
| 3. Modern Clubhead Speeds..... | 2 |
| Appendix A – List of Figures | 4 |
| Appendix B – List of Tables | 4 |

2. Historical Measurement

Up until about 20 years ago only multi-exposure photographic or motion picture capture of a golf swing could be used to estimate clubhead speed. This would require painstakingly looking at the images and determining how far the clubhead travelled between frames/exposures. Further there is difficulty in actually making the measurement with the complexity of the clubhead movement which includes both translation and rotation components. Accurately determining the rotational speed of the clubhead using such techniques requires pictures looking at the swing in both vertical and horizontal (from above) planes. As such early measurements effectively measured only the linear speed of the clubhead.

In his book; *The Science of the Golf Swing*, Dr. David Williams (Williams, 1969) used multi-flash photographs of Bobby Jones, circa 1930, swinging a driver to estimate his swing speed. According to Dr. Williams the photographic record “shows the position of hands and club in thirty-three separate exposures at intervals of 1/100 sec. from start to finish. From this he concludes that Bobby Jones has a clubhead speed of 113mph which leads to a shot of 250-260 yards. In light of the ball aerodynamics of the time these values are completely reasonable. While Bobby Jones was known to be a long driver of the ball in his day, this value is only equivalent to the average clubhead speed of today’s professional. However, given crudeness of the measurement, and the shorter length and heavier weights of drivers in that era, it is again very reasonable.

A similar study was conducted at the US Amateur at Brookline in 1957. There the clubhead speed, ball speed and carry distance data were collected for two elite amateur players; Tim Holland and Robert Kuntz. Examining the 1957 data, the high-speed motion picture record for Tim Holland (a

Walker Cup veteran) demonstrated a peak clubhead speed of 114.5mph. Ball speeds and distances were also determined for these two players.

Launch conditions, including ball speed were subsequently collected at the US Amateur between 2005-2008. These data were compared to ball speeds and distances measured in Brookline in 1957. Once again the results seem to be both reasonable and consistent. (A Comparison of Clubhead and Ball Speeds at the 1957 and 2005-8 US Amateur Championships, 2018)

3. Modern Clubhead Speeds

In the early 2000's radar-based measurements became widely accepted and used. While not without their drawbacks and shortcomings, they did provide a non-obtrusive way to measure player clubhead speeds during actual playing conditions.

Since 2007 the PGA TOUR has been using Trackman to measure launch conditions on selected holes at tour events throughout the year, Table 1. These data show that average clubhead speed has increased by 1.3 mph from 2007 to 2018.

Table 1 Clubhead and Ball Speeds on the PGA TOUR

| | 2007 | 2008 | 2009 | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 | 2016 | 2017 | 2018 |
|--|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| Clubhead Speed (mph) | 112.4 | 112.3 | 111.7 | 112.6 | 112.8 | 113.0 | 113.2 | 113.0 | 113.2 | 112.9 | 113.9 | 113.7 |
| 90 th Percentile Clubhead Speed (mph) | 118.5 | 118.3 | 117.4 | 118.5 | 118.6 | 118.8 | 119.1 | 118.8 | 119.2 | 119.3 | 120.1 | 119.7 |
| Ball Speed (mph) | 165.4 | 165.2 | 165.2 | 166.2 | 166.8 | 167.2 | 167.4 | 167.2 | 167.7 | 167.7 | 168.8 | 169.2 |


Figure 1 shows Trackman's published data of launch conditions including clubhead speed throughout the bag. The equivalent table for the LPGA is shown in Figure 2.

| TRACKMAN | | PGA TOUR AVERAGES | | | | | | WWW.TRACKMANGOLF.COM | |
|---|------------------|--------------------|------------------|--------------|-------------------|-----------------|------------------|----------------------|-------------|
|  | Club Speed (mph) | Attack Angle (deg) | Ball Speed (mph) | Smash Factor | Launch Ang. (deg) | Spin Rate (rpm) | Max Height (yds) | Land Angle (deg) | Carry (yds) |
| Driver | 113 | -1.3° | 167 | 1.48 | 10.9° | 2686 | 32 | 38° | 275 |
| 3-wood | 107 | -2.9° | 158 | 1.48 | 9.2° | 3655 | 30 | 43° | 243 |
| 5-wood | 103 | -3.3° | 152 | 1.47 | 9.4° | 4350 | 31 | 47° | 230 |
| Hybrid 15-18° | 100 | -3.5° | 146 | 1.46 | 10.2° | 4437 | 29 | 47° | 225 |
| 3 Iron | 98 | -3.1° | 142 | 1.45 | 10.4° | 4630 | 27 | 46° | 212 |
| 4 Iron | 96 | -3.4° | 137 | 1.43 | 11.0° | 4836 | 28 | 48° | 203 |
| 5 Iron | 94 | -3.7° | 132 | 1.41 | 12.1° | 5361 | 31 | 49° | 194 |
| 6 Iron | 92 | -4.1° | 127 | 1.38 | 14.1° | 6231 | 30 | 50° | 183 |
| 7 Iron | 90 | -4.3° | 120 | 1.33 | 16.3° | 7097 | 32 | 50° | 172 |
| 8 Iron | 87 | -4.5° | 115 | 1.32 | 18.1° | 7998 | 31 | 50° | 160 |
| 9 Iron | 85 | -4.7° | 109 | 1.28 | 20.4° | 8647 | 30 | 51° | 148 |
| PW | 83 | -5.0° | 102 | 1.23 | 24.2° | 9304 | 29 | 52° | 136 |



Please be aware that the location (altitude) and weather conditions have not been taken into consideration for the above data. Besides these reservations, the data is based on a large sample size and gives a good indication of key numbers for tour professionals.

Figure 1 PGA TOUR Clubhead speeds throughout the bag as published by Trackman.

| TRACKMAN | | LPGA TOUR AVERAGES | | | | | | WWW.TRACKMANGOLF.COM | |
|---|------------------|--------------------|------------------|--------------|-------------------|-----------------|------------------|----------------------|-------------|
|  | Club Speed (mph) | Attack Angle (deg) | Ball Speed (mph) | Smash Factor | Launch Ang. (deg) | Spin Rate (rpm) | Max Height (yds) | Land Angle (deg) | Carry (yds) |
| Driver | 94 | 3.0° | 140 | 1.48 | 13.2° | 2611 | 25 | 37° | 218 |
| 3-wood | 90 | -0.9° | 132 | 1.47 | 11.2° | 2704 | 23 | 39° | 195 |
| 5-wood | 88 | -1.8° | 128 | 1.47 | 12.1° | 4501 | 26 | 43° | 185 |
| 7-wood | 85 | -3.0° | 123 | 1.45 | 12.7° | 4693 | 25 | 46° | 174 |
| 4 Iron | 80 | -1.7° | 116 | 1.45 | 14.3° | 4801 | 24 | 43° | 169 |
| 5 Iron | 79 | -1.9° | 112 | 1.42 | 14.8° | 5081 | 23 | 45° | 161 |
| 6 Iron | 78 | -2.3° | 109 | 1.39 | 17.1° | 5943 | 25 | 46° | 152 |
| 7 Iron | 76 | -2.3° | 104 | 1.37 | 19.0° | 6699 | 26 | 47° | 141 |
| 8 Iron | 74 | -3.1° | 100 | 1.35 | 20.8° | 7494 | 25 | 47° | 130 |
| 9 Iron | 72 | -3.1° | 93 | 1.28 | 23.9° | 7589 | 26 | 47° | 119 |
| PW | 70 | -2.8° | 86 | 1.23 | 25.6° | 8403 | 23 | 48° | 107 |



Please be aware that the location (altitude) and weather conditions have not been taken into consideration for the above data. Besides these reservations, the data is based on a large sample size and gives a good indication of key numbers for tour professionals.

Figure 2 LPGA Clubhead speeds throughout the bag as published by Trackman.

Trackman has also accumulated data for other golfer cohorts. Figure 3 below shows the distribution of clubhead speed for the average male golfer which they define as having a handicap between 14 and 15. (Performance Of The Average Male Amateur Golfer, 2018) These data suggest that LPGA players have swing speeds like that of the average male amateur.

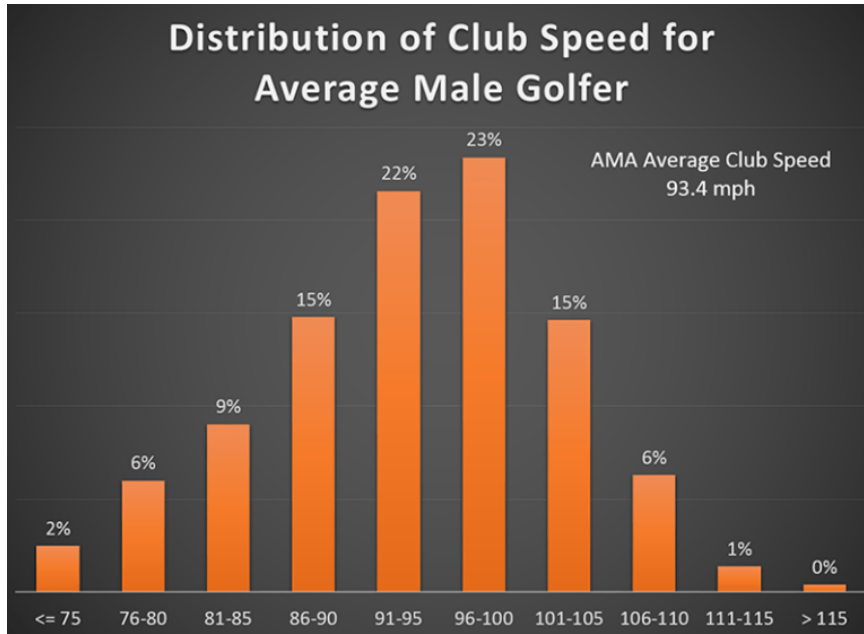


Figure 3 Driver clubhead speeds of the average male golfer as published by Trackman.

The R&A collected launch data for 1667 female golfers ranging from professionals to high handicappers. The clubhead speeds ranged from 93.8 mph (in agreement with the Trackman data) to 62.6 mph for the high handicap females.

Appendix A – List of Figures

| | |
|---|---|
| Figure 1 PGA TOUR Clubhead speeds throughout the bag as published by Trackman..... | 3 |
| Figure 2 LPGA Clubhead speeds throughout the bag as published by Trackman. | 3 |
| Figure 3 Driver clubhead speeds of the average male golfer as published by Trackman. | 4 |

Appendix B – List of Tables

| | |
|---|---|
| Table 1 Clubhead and Ball Speeds on the PGA TOUR..... | 2 |
|---|---|