

# I4a. TrackMan Data - The Club I

## CLUB SPEED

Club speed measured just before impact

**Tour Pro average - Driver** 113 mph

**Tour Pro average - 5 Iron** 95 mph

**Correlations (primary)** Ball speed, Carry, Total

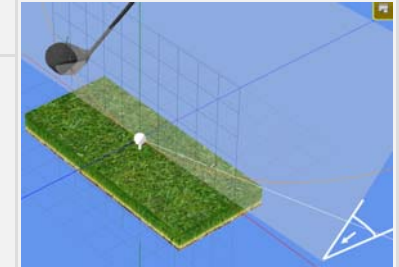


**Notes:** Club speed varies a lot between the different tour players. Tiger Woods is amongst the players with the highest driver club speed – averaging around 124 mph. Highest measured Club Speed on a TrackMan™ is 138 mph (Long driving championship).

## VERTICAL SWING PLANE

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

**Tour Pro average - Driver** 48°

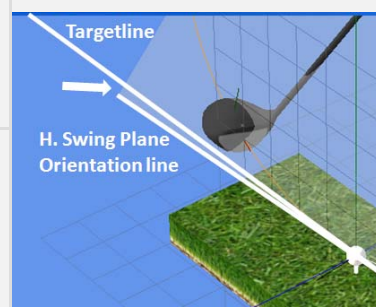


**Notes:** A high value is a steep swing plane – Low value is a flat swing plane. No value is “the right value”, since its dependant on the player’s height, the length of the club, etc. The primary goal is to have a consistent vertical swing plane.

## HORIZONTAL SWING PLANE

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

**Correlations (primary)** Club path, Horizontal Launch Angle

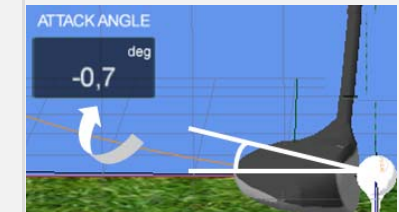


**Notes:** Positive value means swing plane orientation towards the right (inside/out for right handed player) – and negative value means orientation towards the left (outside/in). Tour Pros are swinging outside/ in with a 5 iron – but since they are hitting strongly down on the ball as well (negative attack angle) they are still able to get a squared club path and face angle.

## ATTACK ANGLE

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

**Correlations (primary)** Vertical Launch Angle Spin Rate



**Notes:** Negative value is hitting down on the ball, and positive is hitting up on the ball. Very important in club fitting. Note that there are big differences between pros. The most effective drivers are hitting 4-6° up on the ball – while the less effective drivers are hitting 5° down on the ball.

# I 4b. TrackMan Data - The Club II

## DYNAMIC LOFT

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

### Correlations (primary)

Attack Angle  
Vertical Launch Angle  
Spin Rate



### Notes:

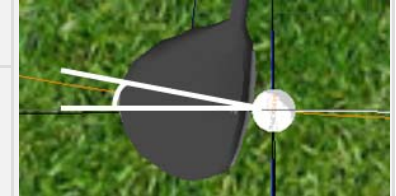
When hitting down on the ball, the dynamic loft will normally be less than the static loft of the club. As a rule of thumb the Dynamic Loft = Static Loft + Attack Angle + adjusted for the impact of the bended shaft (typical +2° for a driver)

## CLUB PATH

The club head path measured at impact. Positive value if 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.

### Correlations (primary)

Horizontal Swing Plane  
Spin Axis  
Horizontal Launch Angle



### Notes:

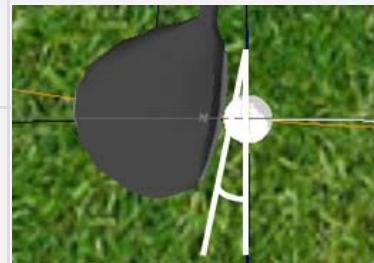
A shot with a Club Path value between -1° and +1° is considered to be straight towards the target. The typical amateur (high HCP) has an outside/in club path, as well as an outside/in horizontal swing plane – resulting in slice or pull. Voice enabling of this TrackMan™ value during practice is very effective, since the player gets instant feedback and knows how much he has to change his swing to get the desired outcome.

## FACE ANGLE

The club head angle calculated at impact on the club face relative to target line. Positive value if the Club head is open at impact.

### Correlations (primary)

Horizontal Swing Plane  
Horizontal Launch Angle  
Spin Axis  
Club path



### Notes:

To get a draw – the face angle value has to be less than the club path value (club head closed compared to club path). If the face angle is ½\*club path – the shot will as a rule of thumb be fading/drawing back on target line. Voice enabling of Face Angle & Club Path value is very effective when practicing straight shots or deliberate draw and/or fade shots.

# I4c.TrackMan Data - The Ball I

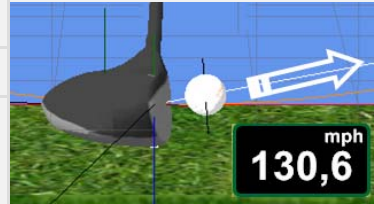
## BALL SPEED

Ball speed measured just before impact

**Tour Pro average - Driver** 167 mph

**Tour Pro average - 5 Iron** 135 mph

**Correlations (primary)** Club speed, Ball type, Club COR, Dynamic Loft, Impact location on clubface



**Notes:** A high ball speed is primarily generated from a high club speed. However, the impact location on the club, the dynamic loft, and the attack angle also play a role in producing the ball speed. The best drivers among the players have high club speed combined with a positive attack angle. This will minimize the spin, give a high launch, and maximize the distance. Tiger Woods is amongst the tour players with the highest driver Ball Speed – averaging around 184 mph. Highest measured Ball Speed on a TrackMan™ is 204 mph (Long driving championship).

## SMASH FACTOR

Ball Speed divided by Club speed, i.e. the ability to transfer power from club to ball.

**Tour Pro average - Driver** 1.48

**Tour Pro average - 5 Iron** 1.42



**Notes:** 1.48 is maximum for a driver (COR regulated)  
For higher lofted clubs the smash factor will be less than 1.48 for center hits. This is because energy is used to generate spin and increase launch angle of the ball

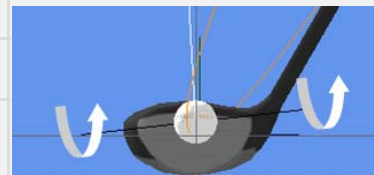
## SPIN RATE

The launch spin measured just after impact.

**Tour Pro average - Driver** 2650 rpm

**Tour Pro average - 5 Iron** 6000 rpm

**Correlations (primary)** Dynamic Loft, Attack Angle

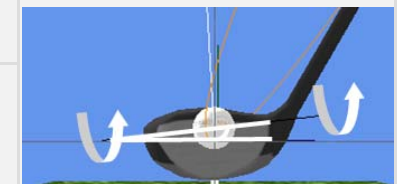


**Notes:** Spin is of major importance for the carry distance and launch angle for high speed shots—a drive in particular. To maximize the driving distance a combination of high launch angle and low spin is needed.

## SPIN AXIS

The spin axis is the axis around which the ball is spinning. The tilting of the axis dictates if the ball will draw or fade. The value is +/- in degrees relative to the horizon. Positive value when the ball is going right – and negative when it's going left.

**Correlations (primary)** Club path  
Face angle



**Notes:** The value is calculated based on the initial ball flight.  
As a rule of thumb the ball will swerve 0.7 % off line per 1° spin axis, i.e. For a 200 yards shot with +5° spin axis starting at the target line, the ball will land 7 yards to the right.

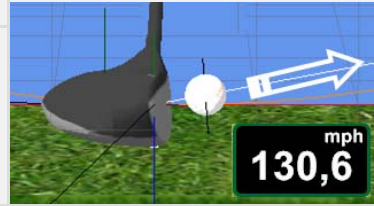
# I4d.TrackMan Data - The Ball II

## VERTICAL LAUNCH ANGLE

The launch angle measured just after impact in relation to the horizon.

### Correlations (primary)

Dynamic Loft  
Attack Angle



### Notes:

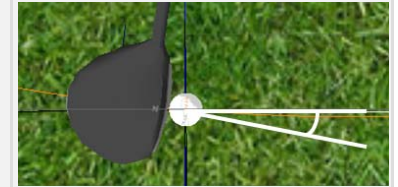
There are big differences between individual pros. The launch angle for a driver ranges from 6-15°, but the most effective drivers among the players are launching at 11° or higher – in combination with low spin rates.  
The optimal launch angle for a driver is individual for each player and is primarily dictated by club speed and attack angle. The TrackMan™ driver fitting application takes the mystery out of finding the optimal launch angle for each player.

## HORIZONTAL LAUNCH ANGLE

The launch angle measured just after impact in relation to target line .

### Correlations (primary)

Club path  
Face angle



### Notes:

## MAX. HEIGHT

The measured maximum height of the ball during the ball flight.

### Tour Pro average - Driver

31 meter / 34 yards

### Tour Pro average - 5 Iron

29 meter / 32 yards

### Correlations (primary)

Dynamic loft  
Ball speed  
Spin rate



### Notes:

The height of golf shots are more or less the same for every club in the bag.

## LANDING ANGLE

The measured landing angle in relation to the horizon.

### Tour Pro average - Driver

39°

### Tour Pro average - 5 Iron

53°

### Correlations (primary)

Vertical Launch Angle  
Ball speed  
Spin rate



### Notes:

Keep it below 40° for a driver. Get it higher than 55° for control on approach shots.

# I4e.TrackMan Data - The Ball III

## CARRY

The carry - measured to same level as launch (carry flat).

**Tour Pro average - Driver** 240 meter / 262 yards

**Tour Pro average - 5 Iron** 166 meter / 182 yards

### Correlations (primary)

Vertical Launch Angle  
Ball speed  
Spin rate



Notes:

## CARRY SIDE

The carry side – measured in relation to target line.

### Correlations (primary)

Horizontal Launch Angle  
Spin axis



Notes:

## TOTAL

The calculated total distance – equals carry plus calculated bounce and roll.

### Correlations (primary)

Carry  
Landing Angle  
Ground conditions



Notes:

## TOTAL SIDE

The total side (left or right) calculated in relation to target line .

### Correlations (primary)

Horizontal Launch Angle  
Spin axis  
Ground conditions



Notes: