



### **Club head speed – peak club head speed vs. impact club head speed.**

As we approach the Rio Olympics, one of the most anticipated events for some is the 100 metre sprint as one of the greatest human challenges has been to explore how fast a human can run. Thankfully we are yet to know the answer to this and for some this is what inspires them to continually search for improvement. In previous times, many humans believed that the four minute mile was unachievable due to many influences such as physiology, biomechanics etc....however thankfully that was proved incorrect and now it is not uncommon to see athletes run the mile frequently in sub 3m 50s. Reductions in this time are due to many reasons, one being the role of science in sport. Science plays a vital role in the development of human performance however two of my favourite scientific philosophies is science allows us to ask better questions as well has helping us achieve a better tomorrow.

Let's apply the 100 metre sprint challenge to golf where one could list increasing driving distance as golf's 100 metre sprint.

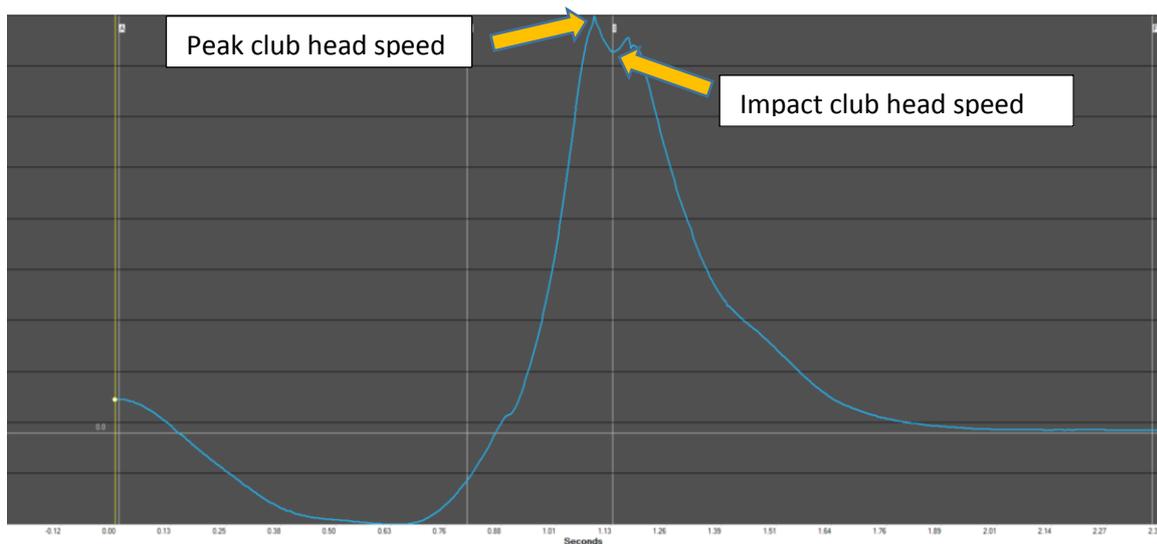
Understandably, one question often asked in a session is “what's my club head speed and how can I increase this?” How to increase club head speed is dependent on many influences and can be as singular as making one adjustment or as complex as chaos theory which involves having to understand the players complete background then knowing what area needs to improve to allow the increase in speed to happen. In short, for some it can be a clearly defined area that needs to change to allow and increase and for others it requires much investigation to establish what needs to improve to see gains in club head speed.

Examples of some scientific devices now employed in golf are 3D motion capture and launch monitors. With the use of 3D motion capture, we can now examine and explore many of the anatomical and biomechanical considerations that help determine club head speed, areas such as segmental speeds, acceleration/deceleration, segment interaction, myofascial elastic recoil, resultant force production/application, segment timing and many more. Also, through the popular availability of launch monitors we can now extract information such as club head speed. Until recently, we were only able to explore club head speed as a singular value on impact (point data), however what we can now plot and observe is club head speed globally throughout the swing. This opens us up to a much greater discussion as it allows us to ask many more questions, two being what is your peak club head speed and what's the club head speed on impact, for some this can be two very different values. Based on manufacture feedback, every 1mph increase/decrease can change carry distance by up to 3 yards (dependant on many influences such as environmental conditions). Just because the launch monitor is displaying your club head speed, this does not mean it is your peak club head speed therefore you could achieve significant gain in carry distance if we aligned the peak speed to impact. Let's look at two very different club head speed plots and examine how one player achieves their peak club head speed in advance of impact with a significant reduction in speed in the final few frames before collision whereas the other applies max club head

speed on impact. Although we receive club head speed as a value returned by the launch monitor, this value itself does not reveal the full understanding. Additionally, it can be difficult to find white paper specifications on some launch monitors as to their mathematical model and how/where they calculate and capture these values, therefore it is important to acknowledge that this discussion is based on not knowing any manufactures mathematical modelling or the accuracy/tolerance within their data.

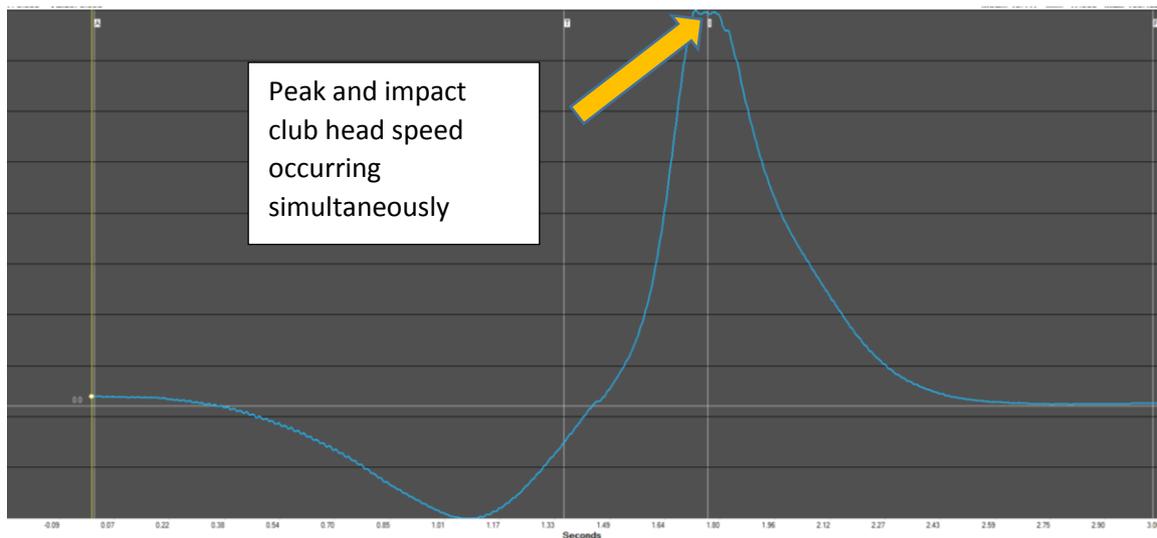
### Sample one

In the plot below, you will see that the peak club head speed produced at any point in swing was 96 mph, this peak occurred approx. 25ms before impact. However on impact the club head speed value returned by the 3D software was 92.5mph (simultaneous launch monitor capture was 91 mph). For this particular shot, potentially 9 yards of carry distance was being lost as well as providing the player with inaccurate feedback. After all, before you even get involved with discussing data it all starts with how credible is the information? When presented with this information, this allowed a much more accurate and provocative discussion as to why this was happening, what needs adjusting to apply this peak to impact and what this speed loss was being influenced by.



### Sample two.

In the plot below, we can see how the player's peak club head speed is being achieved and applied in and around impact. Therefore, if we know this value is their peak, this opens up a different discussion to sample one, mainly as the player is applying and producing their peak on impact, what needs to change to increase this? This can provoke some very interesting discussions and discoveries.



Based on what we now know, how can we use this information:

- When peak club head speed is being achieved before impact, what do we need to adjust to apply this value to impact. This provides us with a much more credible approach to development and help the player understand what they need to adjust to achieve this. As mentioned in previous articles, sometimes you have to work away from the problem to solve the problem which can also translate to 'work where it isn't'
- Much recent discussion has been directed to attentional focus in golf and skill acquisition and refinement, depending on the research, some suggest that internal focus can lead to a reduction in speed, however if peak club head speed is not being applied to impact this could allow the end user to play with and explore where they can direct their attention to match up peak speed to impact.
- It's not the values on screen that are of importance, it's what's behind them. For example, it's how the player is producing these values rather than the actual value itself. Influences can be huge such as concepts, anatomical constraints, equipment specification, arousal levels therefore never adjust what you see, apply the philosophies of chaos theory (originally from a branch of mathematics) which looks at complex systems that are subject to significant change when a very sensitive areas is adjusted. In short, what one adjustment will provide you with the greatest gain?
- What is the club head speed on impact vs. peak club head speed achieved in swing. When you see a value on screen such as club head speed 100 mph, is this the club head speed on impact or the peak club head speed being produced therefore unless you are aware of this is this really helping and providing accurate feedback or possibly misguided awareness? Perhaps a more helpful approach is – ok, is what we are seeing accurate, if not let's go figure out why and what needs to change to increase this?
- Just because the value on screen is being displayed as it is, this does not mean that this is actually happening. It's only true until proven otherwise!

Like most of these areas, as our information improves and more useable data becomes available we will be better placed to help golfers increase club head speed and essentially ball speed, therefore

this is why we must continue to explore and innovate to help uncover more understanding of golf's 100 metre sprint – how do I hit it further? After all, understanding is a common word used in coaching therefore it may be helpful to actually understand the word understanding – for some understanding = knowledge and know how. In short, better education and knowing how to use it.

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