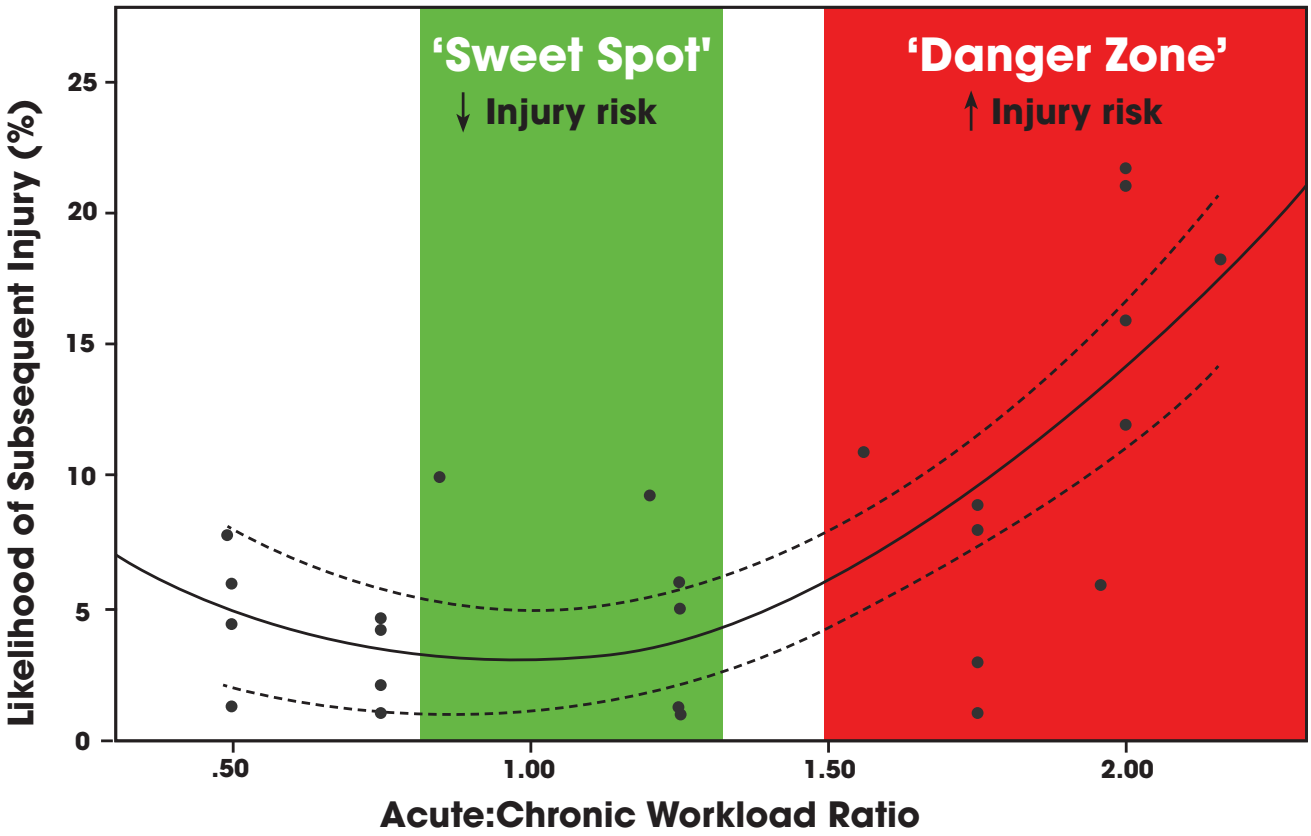
CHAPTER 3

Training Load Management in Football

Likelihood of Subsequent Injury vs. Workload Ratio



Fatigue, Recovery & Endurance

Adding significant training load to underprepared players within the training process or cycle inevitably leads to increased accumulation of fatigue. Based on the specific recovery needs generated by the fatigue, certain individuals may be affected in different ways due to several factors:

- Severity and type of exercises inducing the fatigue
- Training age
- Physical fitness and conditioning levels

Early research performed by Helgerud et al., (2001) using elite football players showed highly individual trained physical capacities are associated with significant performance benefits, such as **increased aerobic capacity leading to greater total distance covered (TDC), number of sprints, improved recovery and greater ball-involvement**.

In addition, recent research in this area have also described how relationships exist between endurance levels and **Total Distance Covered (TDC)** in competitive match-play, which also promoted an increased **Maximal Aerobic Speed** (Swaby et al., 2016).

Adding more credibility to these reports, it is suggested that aerobic endurance capacity is an important consideration with high maximal values correlating with match-play work rate. This results in significant benefits which aid the recovery periods between high intensity playing periods.

Furthermore, developing the training capacity of players offers a protective effect from subsequent injury risk, rather than limiting the training response in fear of injury (Gabbett, 2016).

High Speed Running (HSR) and Sprinting (Maximal Velocity)

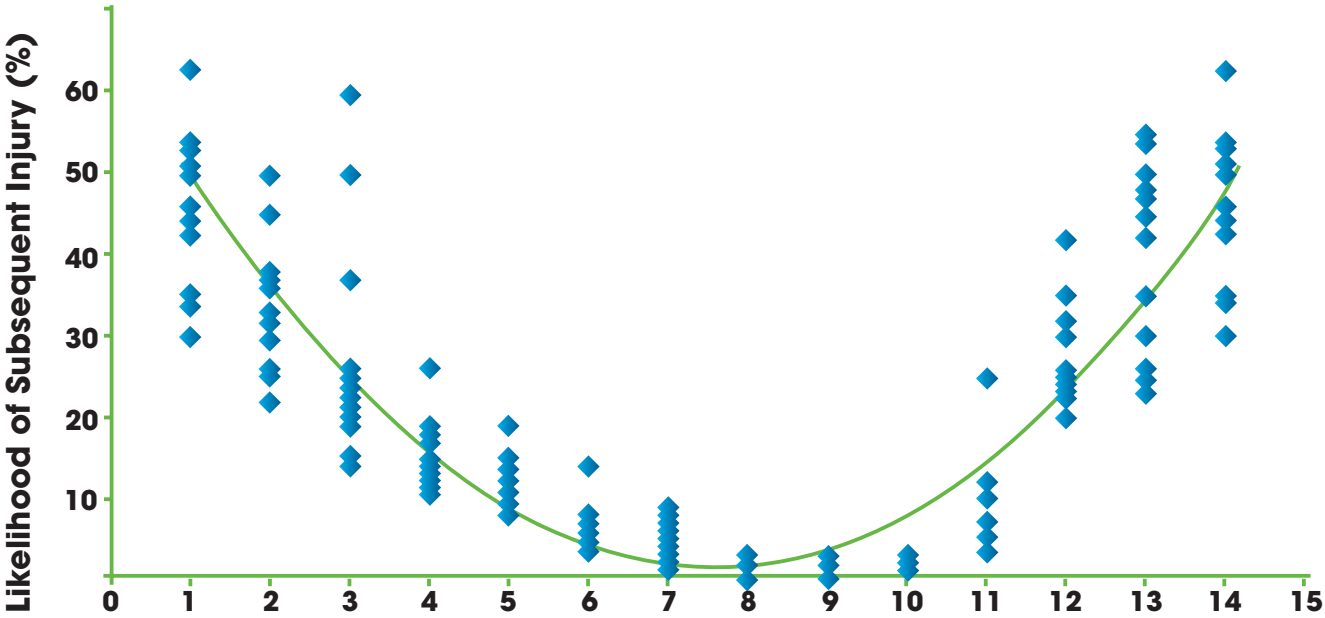
The investigation by Malone et al., (2018) into athletic capability of footballers found players performing significantly higher during the **30-15 Intermittent Fitness Test (IFT)** [30-second shuttle runs interspersed with 15-second walking recovery periods] tolerated greater volumes of **High Speed Running (HSR)** and **Sprint Distance** when compared with players revealing a reduced aerobic fitness. Having highlighted the importance of developing the players aerobic endurance capacity within football through practices/ drills and sessions causing a **cardiovascular overload (small sided games and high-intensity resistance training drills)**, the significant role sprinting and HSR exercises play in reducing injury risk and developing all round-robust players should be considered.

An earlier study by Malone et al., (2016) examined the relationship between sprint exposures and injury risk in Gaelic footballers. The findings reported how **players who achieved >95% of their peak velocity had a reduced injury risk** when compared to players exposed to lower relative velocity. Further detailed analysis of the data revealed how **players who performed excessive loads of peak velocity actions were at increased risk of injury, highlighting a "U" shaped relationship between maximum velocity exposures and injury risk (please see the graph below)**.

Players performing between 6 to 10 sprints >95% Maximum Velocity (Vmax) capacity had a lower injury risk versus players performing less than 5, or more than 11 sprints. Results of this study therefore provide **evidence of a possible ideal sprint stimulus as a method to minimise injury risk in team sports**.

Conversely, when exposed to the same amount of sprinting, players with higher chronic loads had a lower injury risk. Exposing players to rapid increases in HSR and sprint distances increased the odds of injury. However, higher chronic training loads and better intermittent aerobic fitness off-set lower limb injury risk associated with these running distances (Malone et al., 2018).

Association Between Total Weekly Maximal Velocity Exposures and Likelihood of Injury - Taken from Malone et al., (2016)



WEDNESDAY TRAINING DAY PRACTICES: SPEED ENDURANCE

3 DAYS UNTIL MATCH (MD +4/-3)

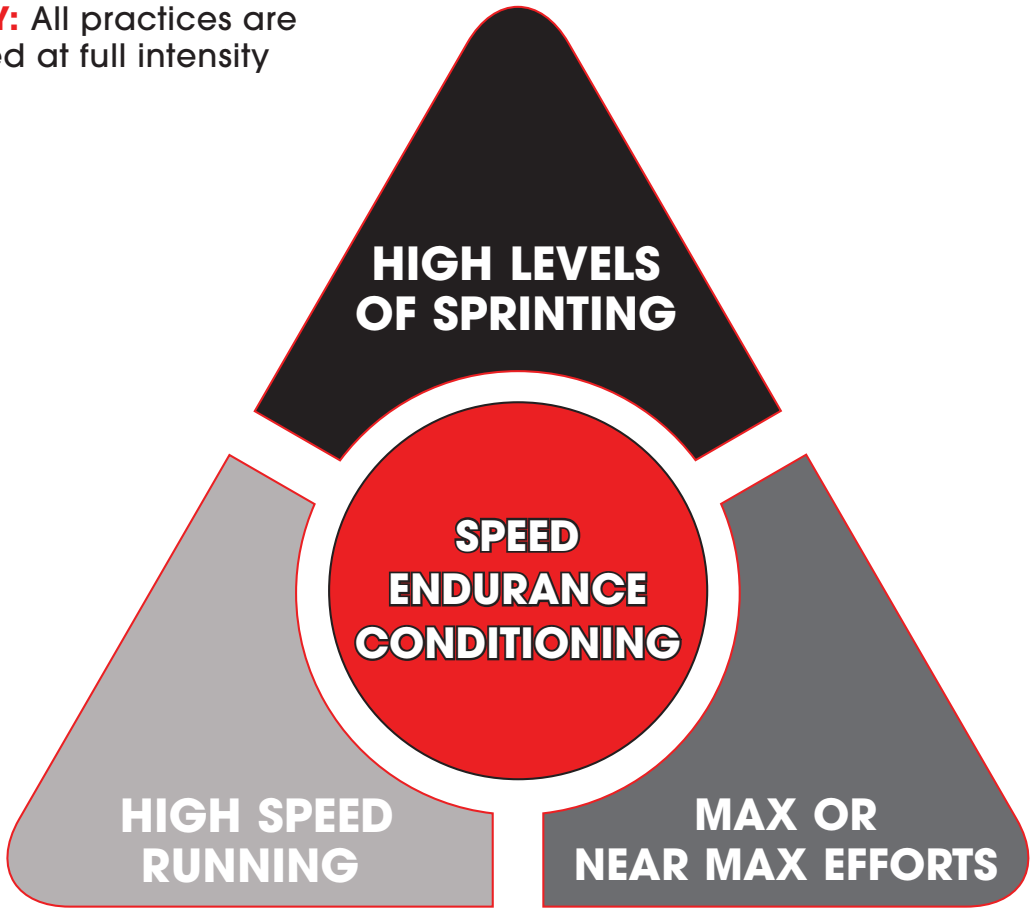
WEDNESDAY TRAINING SESSION (85-95 min)

Collective Team Principle Training and Speed Endurance Development:

1. Speed Endurance Warm-up (10-12 min)
2. Extensive Technical Practice (12-15 min)
3. Speed Endurance Conditioning Practice (5-15 min)
4. Large Sided Possession (10-15 min)
5. Large Sided Game in Large Area (10-50 min)

WEDNESDAY - 3 DAYS UNTIL MATCH (MD +4/-3): Speed Endurance Conditioning Practices

INTENSITY: All practices are performed at full intensity



What are Speed Endurance Conditioning Practices?

- These physical conditioning exercises are classed as `speed endurance' as they expose players to high levels of sprinting and high-speed running metrics.
- They include larger surface areas with maximum or near maximum efforts to run or sprint.

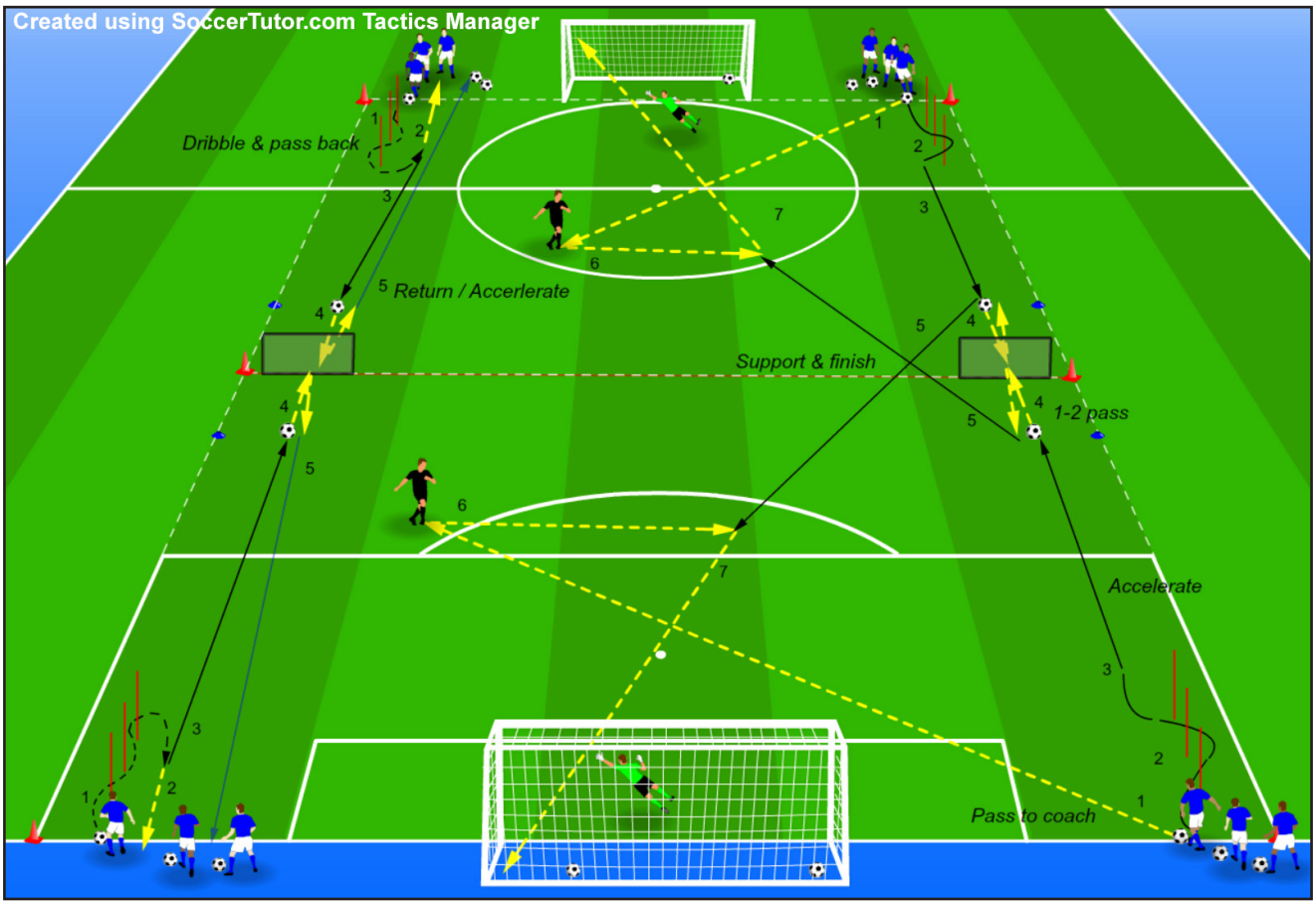
Why are they used on this day of the training week (MD +4/-3)?

- To overload the key muscle groups required on a day that is far enough away from the match day to recover but still elicit a stimulus in order to progress the players' capability to improve their conditioning.

How does this help to maximise performance?

- These high speed and sprint based practices are used on this day as a way of preparing and developing the players' muscles and capacity to perform this type of work in matches.

Speed Endurance Conditioning 6: Dribbling, Passing, and Finishing in a Sprinting Circuit



PRACTICE INFORMATION

Duration	Reps	Sets	Numbers	Size	Work Duration	Explosive HSR Movements
12 min	4 x 60 m	2	12+ (+GKs)	As shown	1.5 min	

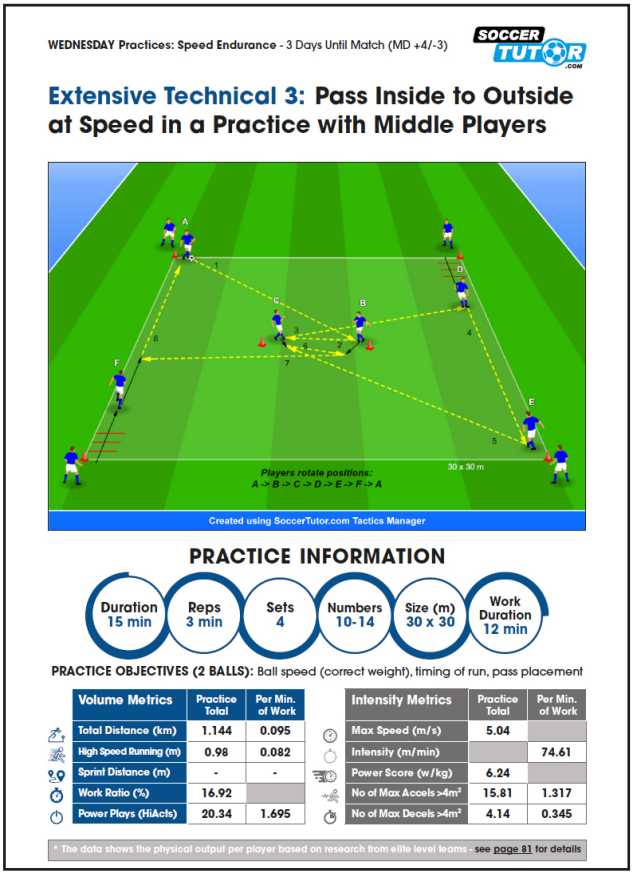
OBJECTIVES: Physical stimulation - high-speed and sprints to develop the capacity to run fast

Volume Metrics	Practice Total	Per Min. of Work
Total Distance (km)	1.04	0.69
High Speed Running (m)	304	202.67
Sprint Distance (m)	50	33.33
Work Ratio (%)	37.8	
Power Plays (HiActs)	8	5.33

Intensity Metrics	Practice Total	Per Min. of Work
Max Speed (m/s)	7.44	
Intensity (m/min)		89
Power Score (w/kg)	4.45	
No. of Max Accels >4m²	2	1.33
No. of Max Decels >4m²	5	3.33

* The data shows the physical output per player based on research from elite level teams - see pages 81-83 for details

The Benefit of the Data for Each Practice (Volume and Intensity Metrics)



WEDNESDAY Practices: Speed Endurance - 3 Days Until Match (MD +4/-3)

Extensive Technical 3: Pass Inside to Outside at Speed in a Practice with Middle Players

PRACTICE INFORMATION

Duration	Reps	Sets	Numbers	Size (m)	Work Duration
15 min	3 min	4	10-14	30 x 30	12 min

PRACTICE OBJECTIVES (2 BALLS): Ball speed (correct weight), timing of run, pass placement

Volume Metrics	Practice Total	Per Min. of Work
Total Distance (km)	1.144	0.095
High Speed Running (m)	0.98	0.082
Sprint Distance (m)	-	-
Work Ratio (%)	16.92	
Power Plays (HiActs)	20.34	1.695

Intensity Metrics	Practice Total	Per Min. of Work
Max Speed (m/s)	5.04	
Intensity (m/min)		74.61
Power Score (w/kg)	6.24	
No of Max Accels >4m²	15.81	1.317
No of Max Decels >4m²	4.14	0.345

* The data shows the physical output per player based on research from elite level teams - see page 81 for details

Where does the data come from?

The data is collected from the elite professional level using GPS tracking equipment.

How can coaches of all levels learn from this data?

In my role as a **coach educator** for Level 2, UEFA B, UEFA A and UEFA Pro Licence, all of the coaches have been extremely excited to have access to the data included in this book.

The information provides a method for all coaches tasked with the performance development of players. The data provides key information from the professional level (average per player), in order to educate the differences between different types of practices and their specific physical loads for coaching at all levels.

It is extremely important to understand how different practices produce specific outcomes and physical development stresses to the players within those sessions. This is key for **tapering sessions and weekly training plans to reduce the risk of injury and for optimising the specific coaching focus from a physical conditioning perspective**.

Why are the volume and intensity metrics useful information to have for each practice?

The values give the readers an understanding of the demands imposed on players. It is extremely important to understand how different practices produce different physical outcomes and stresses. The data figures show you this e.g. Total Distance Covered (m), Work Ratio (%), Sprint Distance (m), etc.

How can this data help me optimise my training plan to produce maximum (peak) level performances?

Selection of practices in the book will generate a better understanding of the physical demands imposed by individual practices and accumulative total sessions over a period of time.

Understanding the physical demands on specific training practices and sessions is a vitally important aspect of the modern coaching strategy to maximise all aspects of training.

The main aim of any training load management process is to provide the individuals involved in the football development of players to positively evaluate and interpret the data they have available to them.

The main point is that all coaches need to now be aware of this information and data, so they can produce the best possible results.

If the same mistakes keep occurring without monitoring relationships between training load and the game, then we may just be guessing, potentially regressing the players development, and providing poor quality training to our players...

KEY TERMS

VOLUME METRICS FOR ALL PRACTICES

Total Distance (km)

Total distance provides a full representation of volume of exercise (walking, running, sprinting, jogging) and is a very simple way of assessing individual effort within the practice or game.

High Speed Running (m)

HSR is distance travelled above speeds of 5.5 metres per second. Greater amounts of high speed running signify a high level of the game or football fitness, however different playing surface areas influence this metric assessed within training. Players will commonly cover HSR distances above 1000-1500m depending on position, maximum speed and fitness levels.

Sprint Distance (m)

Sprint distance is calculated as total distance covered above 7 metres per second. The capacity of players to achieve this is generally higher amongst elite professional players. The playing area significantly influences this value as small sided, reduced areas lower the sprint opportunities. Greater amounts of sprinting signify a high level of game or sport fitness.

Work Ratio (%)

This is defined as the percentage of time the player was performing work or movements. The work is defined as walking or running at speeds higher than 1.5 metres per second (slow to moderate walk for most people). Work ratio in general can be associated with the amount of time a player is working compared to resting during a training session, or game phase.

High Metabolic Load Distance (HMLD)

HMLD measures the total amount of high speed running performed, coupled with the total distance of accelerations and decelerations throughout a session.

Power Plays (HiActs)

This is defined as a significant action (such as acceleration or high speed running event) in which the power output performed by the player was above 20 watts per kg of body weight. Counting power plays gives you an indication of the number of intense actions the players performed in the practice or game. These are obviously far more physically demanding.

Player Density (m^2)

The quantity per unit of playing space per player, which is calculated as follows:
Length of pitch x width of pitch, divided (÷) by the number of players on the pitch.

INTENSITY METRICS FOR ALL PRACTICES

Max Speed (m/s)

Max speed is defined in this book as the fastest maximum speed achieved and sustained for at least half a second. They are represented as metres per second (m/s). For most players, 8.5m/s can be considered quick, but when we compare to elite level sprinters such as world record holder and legendary athlete Usain Bolt, he achieved regular speeds ~11.1m/s.

Intensity (m/min)

Distance per minute provides the coaches and players with an overall representation of how hard, or how intense they have worked. Professional players within competitive match play can achieve between 112–135 m/min, however these results are different depending on the tactical strategy played, and positional differences of the individual players.

Power Score (w/kg)

Calculated as watts (w) divided by your body weight in kilograms (kg) = w/kg. This provides an insight into the power output used per kg of the player's weight and is used to gauge the intensity of training practices with high work-rates within a small area e.g. Small sided games. Practices are considered intense when the power score is above 10 w/kg. Amongst amateur football players, values of 7–8 w/kg are normal.

Number of Max Accelerations >4m^2

Number of accelerations performed in the practice/drill or session that are greater than 4 metres per second^2. These are the higher, more explosive accelerations that demand significant energy, strength and power.

Number of Max Decelerations >4m^2

Number of decelerations performed in the practice/drill or session that are greater than 4 metres per second^2. These are the higher, more explosive decelerations that demand significant energy, strength and power.

Max Acceleration Distance (m)

Total distance accumulated within the session through accelerations performed greater than 4 metres per second^2. These are the higher, more explosive acceleration distances.

Max Deceleration Distance (m)

Total distance accumulated within the session through decelerations performed greater than 4 metres per second^2. These are the higher, more explosive deceleration distances.