EQUINE
ANALYSIS SYSTEMS

MOTION EFFICIENCY

ACCLEROMETER-BASED GAIT ANALYSIS

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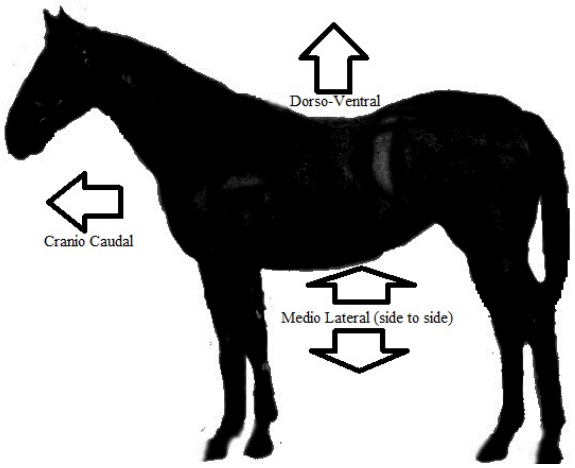
Introduction

Motion Efficiency is a new way for trainers and racing managers to integrate the latest technology into their racing organizations. The system uses highly sophisticated accelerometers, placed inconspicuously on the girth, to examine your horse's movement in three dimensions. Additionally, Motion Efficiency can determine exactly how much power your horse is producing allowing trainers and managers to compare results over different surfaces and have a better understanding of the impact of a surgical or other clinical procedure.

Application

Motion Efficiency utilizes special accelerometers designed to measure acceleration (Gs) in three dimensions: Dorso-Ventral, Medio-Lateral, and Cranio-Caudal. The system is primarily applicable in two scenarios.

Figure 1: Accelerometer Axes

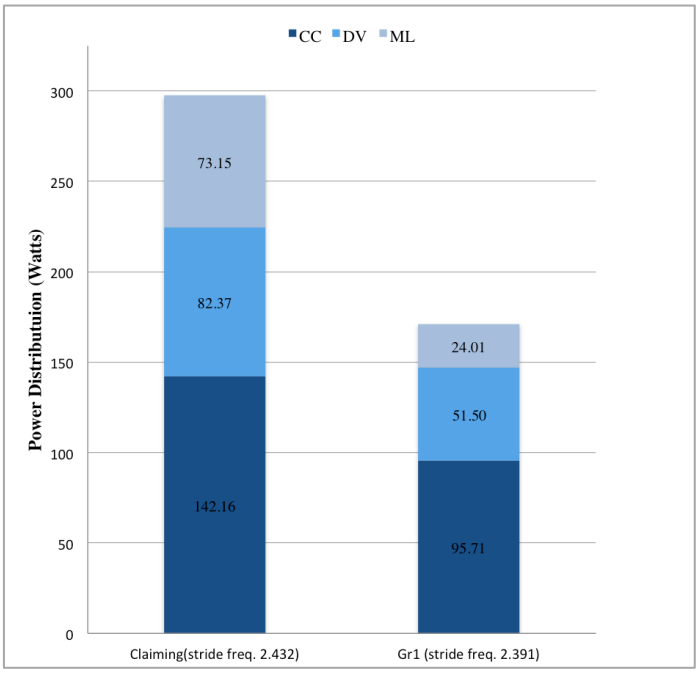


Performance Prediction

Because Motion Efficiency measures the exact acceleration exhibited by your horse among the three axes, it can accurately determine if the majority of your horses power is focused on propelling the horse forward rather than wasting energy with excessive side to side or up and down movement.

The system also determines the overall power created by the horse measured in Watts. Our research has demonstrated that horses with Graded potential are able to move in such a way that they produce *less* power than their peers while running at racing speeds. They are, however, able to focus the power they produce into efficient forward motion with very little dorso-ventral or medio-lateral movement.

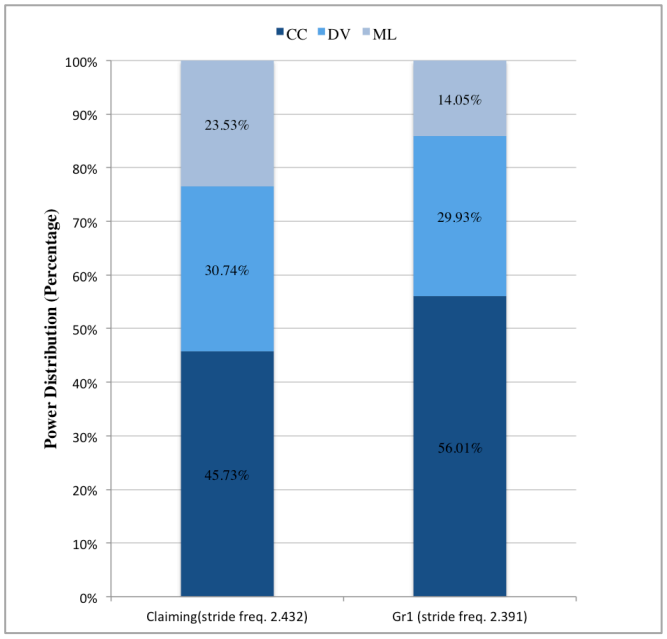
Figure 2: Comparison of Motion Efficiently results, Power expressed in Watts



The horses featured in Figure 2 breezed over the same distance, at 12.4 sec/furlong. Notice how the horse that would go on to win at the Gr1 level actually produces less overall Power (in Watts) than the horse that would only compete at the Claiming level.

It is important to remember that Power is a function of Time and Work. Work is, in turn, a function of Energy and Distance. Since these horses breezed for the same amount of Time over the same Distance, the Claiming horse essentially used more mechanical Energy as a result of the Breeze than the future Gr1 horse.

Figure 3: Comparison of Motion Efficiency Results, Power expressed as percentage overall



In addition to expending the optimum amount of mechanical energy to achieve a certain pace, graded-quality animals also exhibit the ability to direct the majority of their energy into forward motion. Figure 3 breaks down the works from Figure 2 by percentage rather than overall Power. Note that the future Gr1 horse is able to apply over 50% of his energy into forward momentum. Meanwhile, the claiming-quality horse expends considerably more energy in up and down motion.

Motion Efficiency is able to gain an understanding of your horse's ability to move efficiently with only one sub-12 second furlong. Our veterinarians can then accurately forecast if your horse exhibits the motion qualities of graded-quality animals. Keep in mind, however, that your horse's efficiency can vary over different types of surfaces.

Racing Management:

Motion Efficiency can also help trainers and managers optimize the performance of their racehorses. Trainers have long recognized that some horses are more suited to some surfaces than others. Motion Efficiency takes this understanding to a new level, by specifically quantifying the performance of the horse on each surface.

Figure 4: Motion Efficiency Results over different surfaces for the same horse. Total Power.

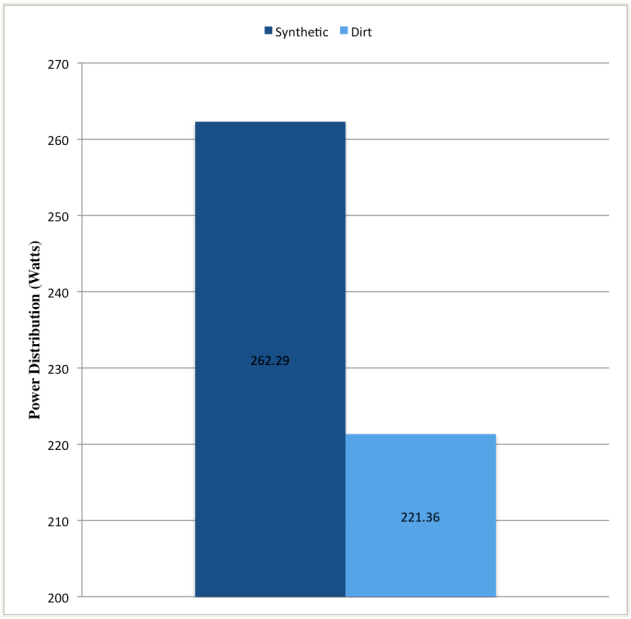


Figure 5: Motion Efficiency Results over different surfaces for the same horse. Percentage CC Movement.

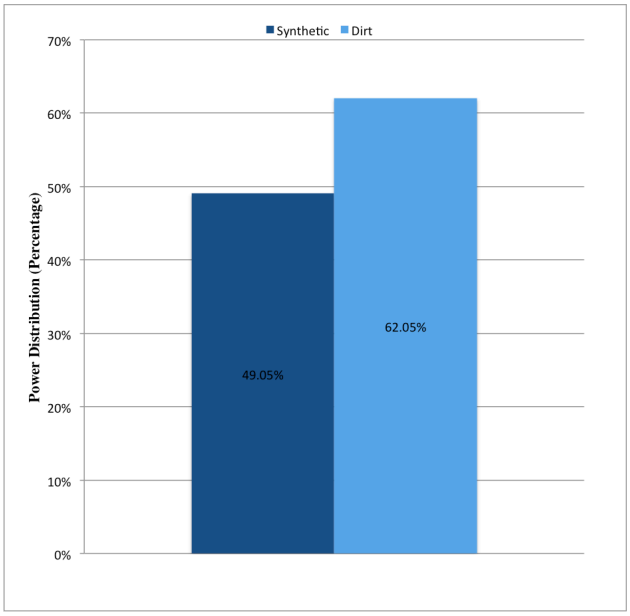


Figure 4 and Figure 5 are from the same horse working the same distance in the same time over different surfaces. Notice how the horse is able to work with less power and increased focus on Cranio-Caudal efficiency on dirt. This horse would go on to win 3 starts on dirt, while never finishing in the top 4 through 5 starts on synthetic surfaces.