

Tested & Proven: The S-Drive Performance Trainer

Scientific Validation Beyond Marketing Claims

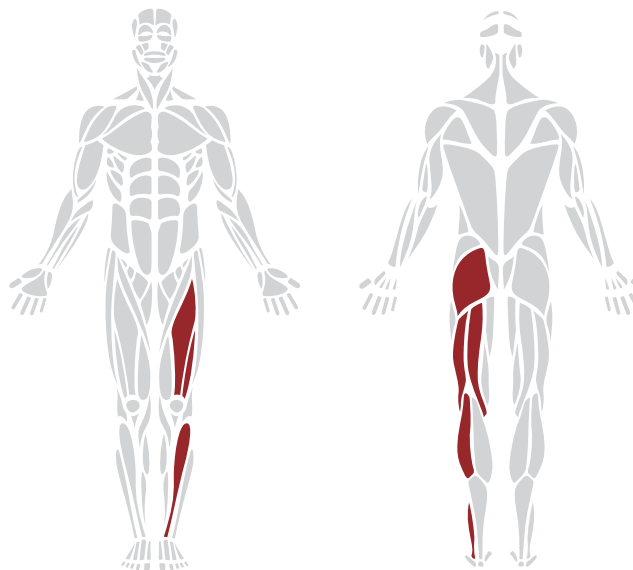
When Matrix Fitness began to develop the S-Drive Performance Trainer, they endeavored to deliver a versatile training tool that could provide the benefits of self-powered treadmills, weighted sleds, resistance parachutes and harness systems in one. To make sure their design exceeded every expectation, Matrix commissioned an in-depth study conducted by a professional biomechanics consultant. Leveraging a variety of accredited sources, the consultant embarked on an exhaustive investigation of muscle activation patterns, resisted vs. resistance-free sprinting and high-intensity interval training. The results demonstrate that the S-Drive Performance Trainer can improve the training experience for a wide variety of athletes and can even help deconditioned users improve their functional fitness.

Muscle Activation Patterns

The study used electromyography (EMG) to compare user muscle activation patterns on the S-Drive Performance Trainer with the muscle activation patterns observed during over-ground sprinting and sled-pushing. The results showed that the S-Drive Performance Trainer induced muscle activation patterns in the calves, quadriceps, hamstrings and glutes that mirrored the over-ground results. Consistent with a recognized biomechanical analysis of sprinting [1], the investigation of the S-Drive Performance Trainer showed that the key muscle groups worked hardest at the beginning of the sprint, with hamstrings showing an identical secondary burst of activity beginning in the sprint's second phase. This consistent muscle activation pattern demonstrates that the athlete's experience is not altered when using the S-Drive Performance Trainer, thereby translating the performance gains developed during training to practical sport and functional activities. By providing true-to-life sprinting and sled-pushing experiences, the S-Drive Performance Trainer can help athletes accomplish their training goals without access to a large track, field or sled, in addition to eliminating the risk incurred by pushing a sled in a crowded indoor training environment.

ELECTROMYOGRAPHY (EMG) is an electrodiagnostic medicine technique for evaluating and recording the electrical activity produced by skeletal muscles.

- tibialis anterior
- medial gastrocnemius
- soleus
- vastus lateralis
- rectus femoris
- semitendinosus
- bicep femoris
- gluteus maximus



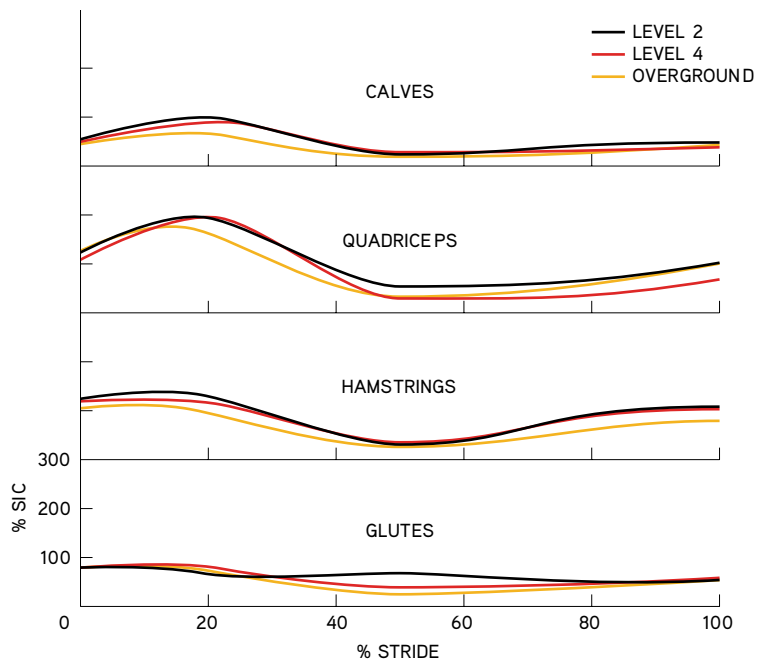
Resisted vs. Resistance-free Sprinting

Resisted sprinting has been shown to improve maximum sprinting velocity and acceleration by increasing the resistance-free stride length [2]. Furthermore, athletes that can adapt to resistance have been shown to produce greater force during the ground-contact phase of the stride, resulting in a longer stride and increased speed [3]. By demonstrating the same changes in stride length, it is reasonable to hypothesize that the S-Drive Performance Trainer effectively replicates the significant improvements in overall speed provided by traditional resistance training. Unlike traditional resistance training, the S-Drive Performance Trainer does not require access to cumbersome equipment or a large space, thereby making the benefits of resistance training more accessible to athletes of all kinds. The S-Drive Performance Trainer also demonstrated another notable advantage over traditional resistance training, in that coaches and trainers can position themselves much closer to the athlete to carefully refine form with immediate feedback that is not possible when the athlete has distanced themselves with a sprint.

HIIT for Everyone

High-intensity Interval Training (HIIT) — a form of training that uses short bursts of exercise at high intensities — has been shown to improve aerobic and anaerobic fitness, blood pressure and cardiovascular health while burning fat and maintaining muscle mass [4]. Additionally, HIIT burns 6-15% more calories due to post-exercise oxygen consumption [5], and HIIT programs lasting 2-15 weeks have been shown to improve cardiorespiratory fitness by 4-46% [6]. While there is no debate about the S-Drive Performance Trainer’s ability to provide a HIIT platform, the study discovered that the S-Drive Performance Trainer did make HIIT accessible to a wider range of users than traditional cardio equipment. Because there is no top speed limit, even elite athletes can reach their heart rate threshold. Conversely, since the S-Drive Performance Trainer starts at true zero mph, physical therapy patients and deconditioned users can approach their heart rate threshold at low speeds with high resistance.

FIGURE 1. EMG signal normalized to standard isometric contractions (SIC) [1,2] over a stride. Level 2 and Level 4 are on the S-Drive Performance Trainer.





An Effective Training Tool

The study shows that the S-Drive Performance Trainer is a valuable, scientifically supported training tool in several respects:

- Muscle activation patterns mimic over-ground sprinting and sled-pushing without access to a track, field or sled, simultaneously eliminating the risk of pushing a sled indoors
- Resisted vs. resistance-free sprinting replicates the speed gains of traditional resistance training without extra equipment or space while also allowing for improved coaching and immediate feedback
- The unlimited top speed and true zero mph start speed allow both elite athletes and deconditioned users to take part in HIIT more effectively than traditional treadmills.

For more information on the S-Drive Performance Trainer, visit matrixfitness.com

References

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