



KOMPAN FITNESS INSTITUTE

# KOMPAN CROSS TRAINER: THE SCIENCE BEHIND

White paper by Morten Zachø, MSc, KOMPAN Fitness Institute

*“On the KOMPAN Cross Trainer, the ellipse is carefully optimized towards the ability to use bodyweight and leg muscles in the work-producing phase of the ellipse ...”*



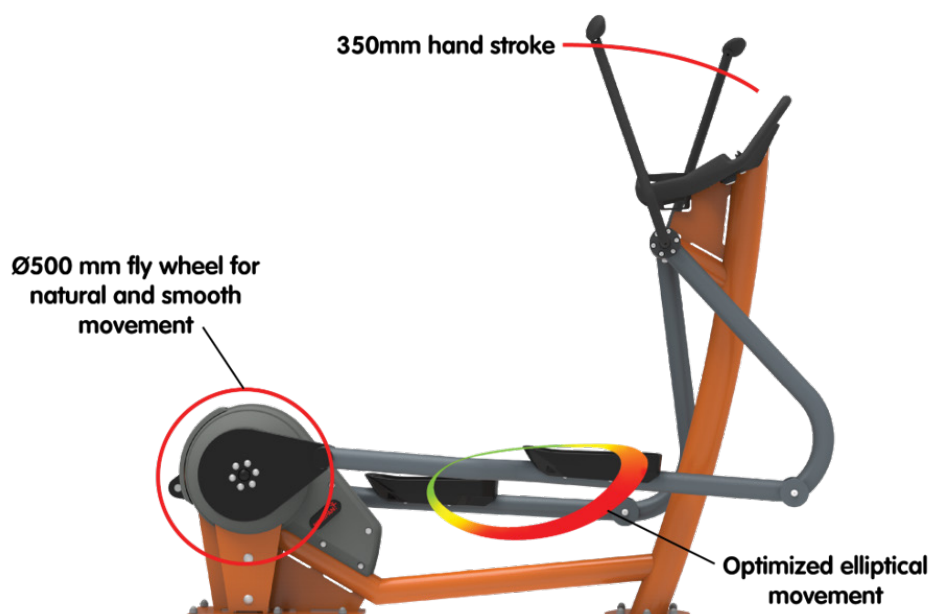


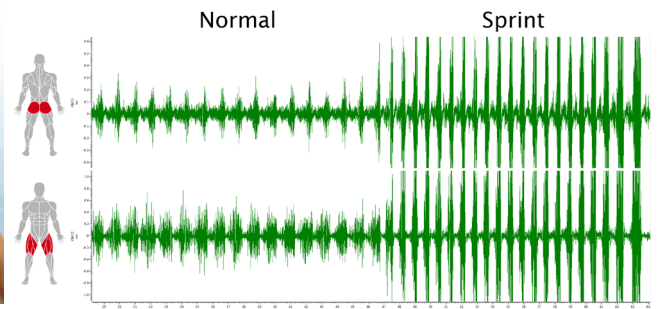
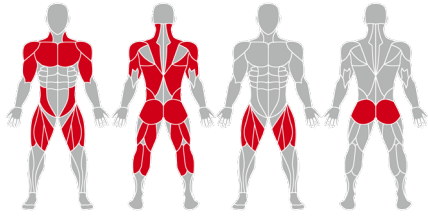
**The cross trainer is one of the most popular pieces of fitness equipment, and for good reason. It is low impact and involves most muscle groups in a natural movement pattern.**

### **The Elliptical Motion**

Cross trainers are also referred to as ellipticals because of the elliptical motion created by the feet. However, on many indoor cross trainers this elliptical motion is rarely optimized and sometimes even tends to be linear.

On the KOMPAN Cross Trainer, the ellipse is carefully optimized towards the ability to use bodyweight and leg muscles in the work-producing phase of the ellipse (downwards – backwards). Together with a large flywheel and a large hand stroke, this maximizes the work that can be done and minimizes discomfort.





## Muscle involvement

From a simple biomechanical analysis, it can be deduced that in normal use, all extensor muscles of the lower body are activated, rotating muscles of the torso and push/pull muscles of the arms. The special sprint mode developed by KOMPAN is intended to increase activation of the glutes and quads. We measured this with electromyography in the laboratory facilities at the University of Southern Denmark. As can be seen from the figure above, sprint mode made it possible to dramatically increase muscle activation of the intended muscle groups.

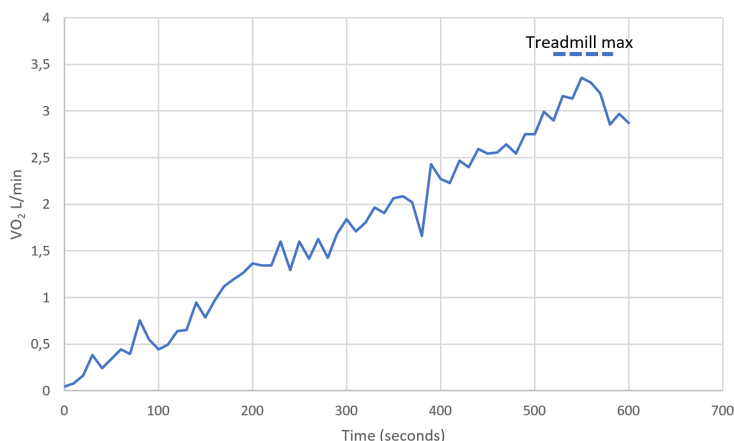


## Oxygen uptake

The measured oxygen uptake is a direct measurement of how effective the workout is. During an incremental test, our female test subject reached a maximum oxygen uptake (VO<sub>2</sub>max) of 3.3 L/min. This value was above 90% for what she was able to reach during a maximum test on a treadmill. In short, this means that the KOMPAN Cross Trainer is on par with the absolutely most effective aerobic exercises available.

*“... this means that the KOMPAN Cross Trainer is on par with the absolutely most effective aerobic exercises available.”*

Oxygen uptake during a cross-trainer max test



## Summary

The KOMPAN Cross Trainer has an optimized movement pattern that allows for effective engagement of all major muscle groups. The specially developed sprint mode dramatically increases activation of the thighs and buttocks, documented by EMG measurements. The optimized movement pattern, together with the adjustable resistance, allows for training intensities from very low to very high, as verified in the lab with direct measurement of oxygen uptake.





Morten Zacho, Senior Manager of KOMPAN Fitness Institute, testing the KOMPAN Cross Trainer in the laboratory of University of Southern Denmark.

## KOMPAN SPORT & FITNESS

KOMPAN Fitness Institute has a mission to create effective exercise equipment and make it available in the outdoors to provide a public health effect. Freely available outdoor gyms have the potential of bringing people together and make training accessible for all. The KOMPAN Fitness Institute collaborates with universities and follows scientific research closely. The accumulated knowledge is leveraged in product development with user tests and functionality design. The aim is to create fitness equipment of the same quality and effectiveness that you would expect from a commercial indoor gym.



### KOMPAN North America

Kompan, Inc.  
605 W Howard Lane, Suite 101  
Austin, TX 78753  
USA  
Tel.: +1-800-426-9788  
contact@kompan.com  
www.kompan.us