

ECSS-WORKSHOP

**High performance Exercise Testing;
Wingate sprint test and Pedal Force Measurement: a practical
approach.**

Duration app. 45 minutes

In this workshop the differences between hyperbolic, linear and fixed Torque ergometry will be explained. The method, relevance and interpretation of the Wingate anaerobic sprint test will be presented/discussed. During a live demonstration the participants will have the opportunity to get experience in executing a technically well performed Wingate test.



The second part of this workshop will consist of a presentation about Pedal Force Measurement, followed by a live demonstration of a high performance exercise test with Pedal Force Measurement. Possibilities of analyses will be demonstrated and the participants can practice working with a Pedal Force measurement themselves.

The session will be closed with the distribution of a workshop Certificate (pre-registration required) for participants with a late registration the Certificate will be sent afterwards.

For registration contact the Lode marketing department at: jdijkstra@lode.nl mentioning participation workshop ECSS. Please state on which date and at what time you would like to register for participation or use the registration form.

ABSTRACT

High performance Exercise Testing; Wingate sprint test and Pedal Force Measurement: a practical approach

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With an electromagnetical ergometers you can perform a hyperbolic exercise test, this is a test with a constant workload -rpm independent in a certain range-. In some more advanced ergometers you can perform a linear test so that you ergometer will react as a normal roadbike -rpm dependent-; or even with a fixed Torque. This fixed Torque mode is necessary for the Wingate test.

The Wingate test is an anaerobic sprint test developed by Mr Oded Bar-Or. The test is executed with a constant Torque. This Torque has to be determined for every test subject. A rough estimation is the body weight times the torque factor 0.7. For more precise definition of the most efficient Torque more tests have to be done.

The relevance of anaerobic performance in ergometry: Anaerobic fitness is a local characteristic of the muscle because of its independence on blood and oxygen supply in the muscle. Depending on the type of activity (sport) a higher or lower anaerobic power may be expected. Like training some diseases can affect the anaerobic performance of a person as well. Most common is limb immobilization. The Wingate test is used in research for patients with obesity, cerebral palsy, Duchenne, cystic fibrosis etc. (for instance to show the relationship between hypoactivity and several chronic diseases in children from 5 years and up).

The Wingate test is used world wide and is considered the most popular test of anaerobic muscle performance. The test is based on cycling at maximal speed for 30 seconds against a high braking force. This force remains constant throughout the test. Mechanical power is measured during the 30 seconds using the equation: $Power = force \times velocity$

Because the braking force (Torque in Nm) remains constant, only the pedaling speed needs to be measured to calculate the power. Because crank length is constant, the braking force also remains constant. The original test duration is 30 seconds, but a lot research is done with other durations and multiple Wingate tests as well.

The 3 mostly used parameters that describe the person's performance in Wingate test are; Peak power, Mean power and rate to fatigue.

Pedal Force Measurement: during the exercise test it is possible to measure how the forces are divided over the cranks. With the measured values you can advise the athlete or patient about injuries, efficiency of the bicycle movement, body attitude at the bicycle, left-right comparison, evaluation rehabilitation process and adjustments of the racing bike (f.i. crank length).

One of the applications of Pedal Force Measurement:

Research is done in the Netherlands at the Maxima Medical Centre in Veldhoven by the sport physicians: G. Schep, A. Hoogveen, M. Bender, W. de Vries and P. Wijn with top cyclist who developed sport related flow limitations in the iliac arteries.

In current sport medical practice this diagnosis is often missed, since a vascular cause is not expected in this healthy athletic population. In the early stages, when kinking has not led to intimal thickening or excessive lengthening, simple surgical release of the iliac artery is effective. With the help of pedal force measurement before and after surgery, the effect of the cycling position in order to decrease hip flexion and not to actively pull the pedal upwards can be made visible and the success of the operation (lack of pain complaints) can be measured.

TIME SCHEDULE WORKSHOPS

July 6:

11.40 – 12.25 h
14.15 – 15.00 h
15.30 – 16.15 h

July 7:

09.45 – 10.30 h
11.40 – 12.25 h
15.15 – 16.00 h

July 8:

09.40 – 10.25 h
10.25 – 11.10 h