Information for Pathways Head Coaches, Coaches and Scientists

Description and implementation: Power-Profile

V1.0 Created January 2009
V1.2 Updated July 2010
V1.3 Updated October 2011
V2.0 Updated October 2012
V2.1 Updated December 2012
V3.0 Updated October 7, 2014
V3.1 Updated October 25, 2014
V4.0 Updated September 11, 2017
V4.1 Updated September 17, 2019

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Background

After numerous discussions over the previous 12 months it has been agreed that a simple form of a power profile would be introduced back into the ergometer test battery for all aspiring underage National Team members. The aims of the power-profile have not changed since its first inception back in 2009 but with its reintroduction we aim to make the battery easy to implement as well as ensure a bigger window of opportunity in which to collect the required information. Listed below are the original aims of power-profile;

1. It can provide highly useful information on the energetic continuum of each individual rower which should be used by coaches and scientists to infer changes in anaerobic capacity and maximal aerobic power
2. It can be undertaken on large groups of athletes at a single time and does not require the direct input / monitoring of rowers by trained sports scientists
3. Group data could be used by each coach to objectively assess the effectiveness of their training cycles since the last series of tests and ultimately plan future blocks of training based on strengths and weaknesses of each rower
4. Facilitate our elite group to become more reliable and better equipped to produce maximal efforts over race like distances with the aim to ultimately improve our "big race capabilities"

Lessons learned from previous implementations of the power-profile have demonstrated that the stated aims above are secondary to the pure performance aspects of the protocol. i.e. time to complete the distances became paramount above training related information gained from the protocol. Although the competitive nature of our elite rowers should never be marginalised it is important to emphasise that the power-profile is a measure for the individual athlete and reflects their current fitness traits and willingness to express their maximal capabilities over a number of test durations. In the current iteration of the Power Profile (V4.1) we plan to review the aims of the test to ensure that National Pathway athletes are undertaking regular near maximal to maximal efforts of 500m, 2000m and 5000m distances to ensure the Nationally prescribed training is being undertaken at the appropriate times of the domestic and international seasons. This the Power Profile V4.1 forms a major aspect of athlete preparation for National prescribed ergometer assessments as well as providing opportunity for coaches and athletes to assess current fitness traits and assess the effectiveness of the current training cycle across multiple time / power domains.

An opportunity to re-assess the effectiveness of a power-profile has presented itself. After lengthy discussion with Pathways coaches and Leadership Team it has been decided the Power Profile should undergo some restructuring for the 2018-2020 seasons. Changes will be made to the number of test distances / durations used in the profile, the time frames provided to undertake the profiles and the number of mandatory test periods across the domestic and international seasons.

The major criticism of the original power profile was that it was a full week protocol that had the potential to disrupt routine training rather than be included as part of it. A main aim of the new power-profile is to ensure the profile forms a simple aspect of routine training, the test battery window is extended to provide every opportunity to complete the battery in a reasonable time frame and that the order of individual tests within the battery is inconsequential to the determination of the power profile continuum. It is an aim of the revised power-profile that the mandatory and highly recommended ergometer trials that form part of the Pathways

Event Requirement can in essence also become measures for the power-profile and as such assist with easy implementation of the profile.

Revised power-profile tests

To complete a successful power-profile assessment V4.1 only requires 3 tests (over a variety of distances or times) to be completed at near maximal to maximal intensity within a 2 week window. The timing of the revised power-profile has been placed with other designated Underage Event Requirements to assist with ensuring the athletes each get an accurate snapshot of their fitness traits as well as minimising any disruption to routine training. The other tests that must be undertaken within a 2 week period (at a time that best suits the athlete and coach) are outlined below;

- Test Effort 1 (80-100 secs) – 500m (standing start – Open Rate)
- Test Effort 2 (4-8 min duration) – 2000m and / or 4 min maximal step from 7x4 test (must be completed within the 2 week window to be relevant
- Test Effort 3 (15-20 min duration) – 5000m (Near maximal to maximal) and/or
- Test Effort 4 (30 min duration) – 30 min Open Rate test

The order of the tests outlined here are not important to the overall power profile and as such each athlete and coach has the choice to fit each of the test efforts into routine training over a 2-week period.

Frequency of the Power Profile

In previous iterations the power-profile was undertaken approximately 4-6 times per domestic preparation. In the first two years of the cycle there were more tests and in the last two years the Senior A team were given some latitude and the frequency of the tests decreased. Now that selection ergometer tests are required in September and December (5000m) and again in January and March (2000m) then the frequency of the revised power-profile should nestle in around those commitments and good training blocks.

Test period can be found in the Pathways Event Requirements relevant to each age category

Although the dates listed above are the 'highly recommended' test dates it is encouraged that additional power profiles are completed if the need arises. As the power profile is simple to plan into routine training it is possible that additional power profiles could be completed in other key phases of the domestic season.

Structure of the Power Profile

The aim of V4.1 of the Power Profile protocol is to provide as much flexibility with the structure of the tests as possible in order to allow coaches to individualise the tests to fit with the training location and the athlete group. As such there is no set order to completing the power-profile but there are some guidelines below in which to follow;

1. Test effort 1-4 should be completed as quickly as possible (i.e. maximal efforts) but with a strong technical focus and all from a standing start – please use the suggested relative intensity bands (as

found in the U23 NTB) to ensure the minimum pacing is correct. Maximal efforts are always strongly encouraged at any time point in the season but as a minimum 90% efforts can be accepted to provide sufficiently relevant information around current training status

2. The test order is not prescribed and should be set to best suit the coach and athlete
3. All tests must be completed within a 14 day period
4. Athletes must complete Test Efforts 1-2 and one or both of Test Effort 3 and Test Effort 4

Ergometer Drag Factors (Test Efforts 1-4)

As with all ergometer tests in the 2012-2016 quadrennium all tests will be completed on a stationary Concept II ergometer with each individual athlete choosing their drag factor. For standardisation of results it is strongly encouraged that drag factors not be changed either within the 2 week test period or ultimately across the domestic and international seasons. Listed below are the drag factor guidelines for each category.

Category	Stationary Ergometer
Heavyweight Men	130
Lightweight Men	125
Heavyweight Women	110
Lightweight Women	100

Power Profile Test Administration

Preparation

Equipment Checklist
Concept IID or IIE rowing ergometer
Heart rate monitor (can provide very useful information for some individuals)
Stopwatch
Lactate Pro2 analyser (can provide very useful information for some individuals)
Data recording sheet or computer to access online data entry forms

Power-Profile Test Administration (Test Efforts 1-4):

Athletes will be allowed to individualise their warm-up prior to each ergometer measurement but are asked to replicate as closely as possible the same specific warm-up adopted for each distance the next time they undertake the test.

The following list represents the order in which each test should be completed.

1. The athlete should weigh-in and report the weight to the supervising coach or scientist
2. Attach a heart rate monitor (mandatory) and ensure it is working correctly
3. Adjust the ergometer drag factor to that appropriate to your category (see Drag Factor Settings table above)
4. Undertake individual warm-up
5. Select the appropriate distance (or time for the 30 min test) for the ergometer test on the Concept work monitor
6. Start rowing when instructed by the coach or scientist
7. Complete the required distance in the shortest possible time with a high technical focus
8. At the end of the test, the coach or scientist will record the relevant data from the work monitor
9. An earlobe or fingertip blood sample can be collected immediately and 4 min post completion of the test.

30 min R_{OPEN} Test Administration

Athletes will be allowed to individualise their warm-up prior to each ergometer measurement but are asked to replicate as closely as possible the same specific warm-up adopted for each distance the next time they undertake the test.

The following list represents the order in which each test should be completed.

1. The athlete should weigh-in and report the weight to the supervising coach or scientist
2. Attach a heart rate monitor (mandatory) and ensure it is working correctly and the data is being recorded (minimum of 1 min intervals) on the Concept II work monitor or athlete's watch
3. Adjust the ergometer drag factor to that appropriate to the category (see Drag Factor Settings table above)
4. Undertake individual warm-up
5. Select time on the Concept work monitor and ensure the data is being recorded at 2 min intervals for later analysis
6. Start rowing when instructed by the coach or scientist
7. Complete as much distance in the 30 min allocated time as possible (there is no rating cap)
8. At the end of the test, the coach or scientist will record the relevant data from the work monitor on the supplied data template; av. power, av. stroke rate, av. heart rate, distance covered and RPE
9. FTP is calculated as the average power from minute 5 to minute 25 (20 time points) or estimated by 30 min OR power x 0.98:
10. An earlobe or fingertip blood sample should be collected and analysed at the completion and 4 min post completion of the test (if available)

Submission of ergometer test data

Data from the Power profile test should be recorded in the athletes own ROWE.RS account. Please contact Tony Rice if you athlete does not have a Pathways ROWE.RS account

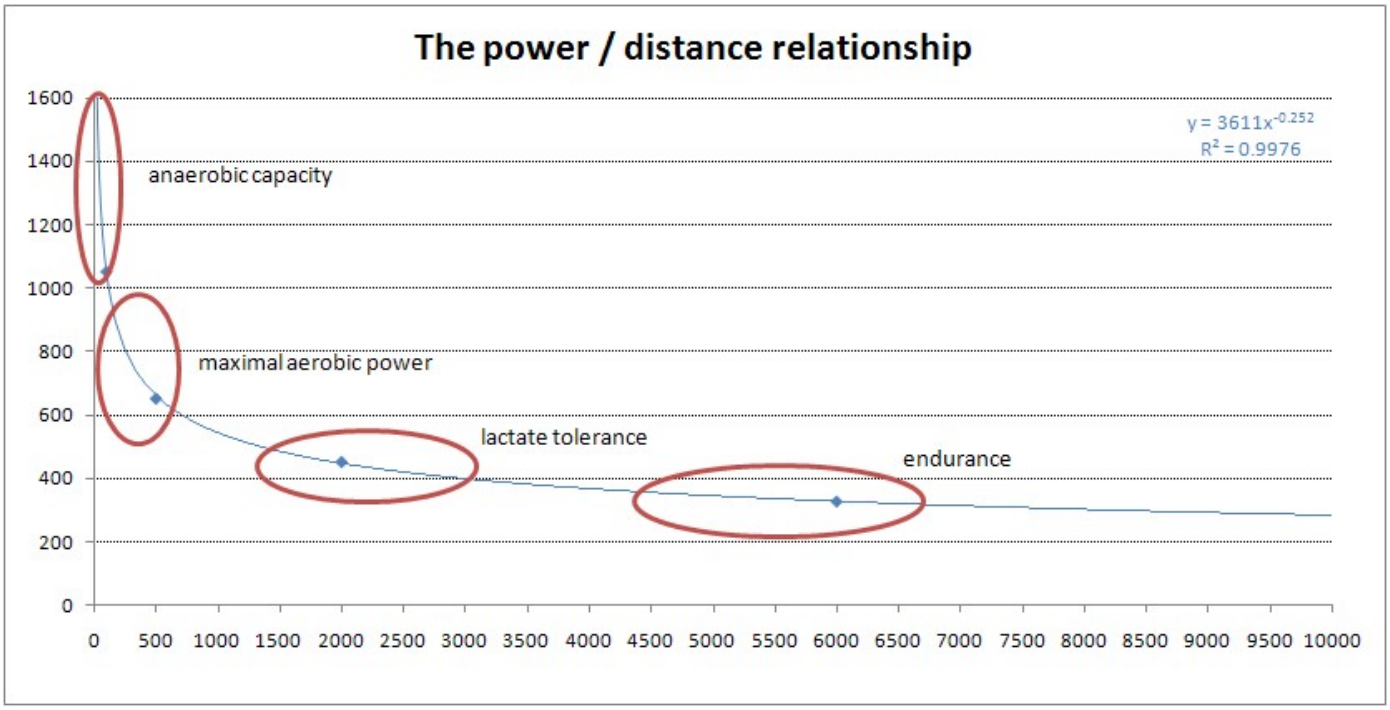
Data Template Download

Evaluation and implementation of the data

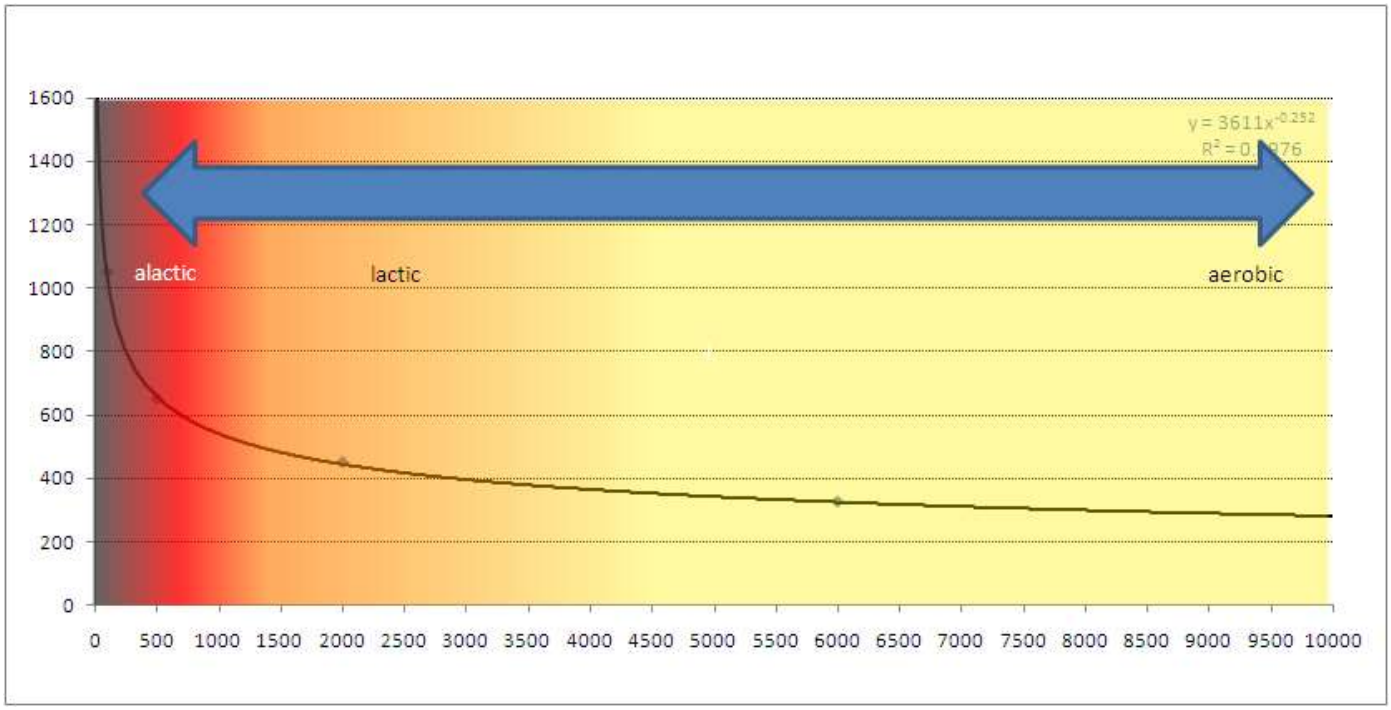
The final aspect of the delivery of the power-profile, which needs significant improvement across the country, is the evaluation and implementation of the data to confirm or adjust training. It is critical to the uptake and effectiveness of the protocol that the information gathered is used appropriately to assess change within an athlete's physiological profile as a result of training. It must be the responsibility of your SIS/SAS scientist, in collaboration with you and the National Lead Physiologist to undertake a review of each athlete's data with respect to the training they have completed and the aims of the relevant training cycle. Tools for the effective evaluation of the power-profile data are available. Please find below the original document which outlines how best to use the data from the power-profile.

How can the ergometer test battery assist with training prescription and modification?

The relationship between power output and time (or ergometer distance as it can be expressed in rowing) has been used for decades to measure shifts in a variety of fitness traits within an individual as a result of training or detraining. The power / time continuum (sometimes referred to as Critical Power) is currently used by the Danish rowing association to tailor training programs to meet the individuals strength and weaknesses of their elite rowers and is based on the assumption that different power outputs have varying levels of sustainability governed directly by the interrelated energy systems available to fuel mechanical work (i.e. alactic, lactic and aerobic). Quite simply the test battery asks the question; "Given full fuel reserves how quickly can an individual complete a set amount of work"? The Danish test battery requires each athlete to complete a maximal test over 10 sec, 60 sec, 2000m, 6000m and 60 min in a one week period. From the data, a power output / time relationship for each athlete is established and then compared with their previous data as well as with data from other athletes. In the diagrams below a power output / distance relationship (vertical axis and horizontal axis, respectively) is shown for four distances (100m, 500m 2000m and 6000m) and the curve fit demonstrates how the continuum is established.

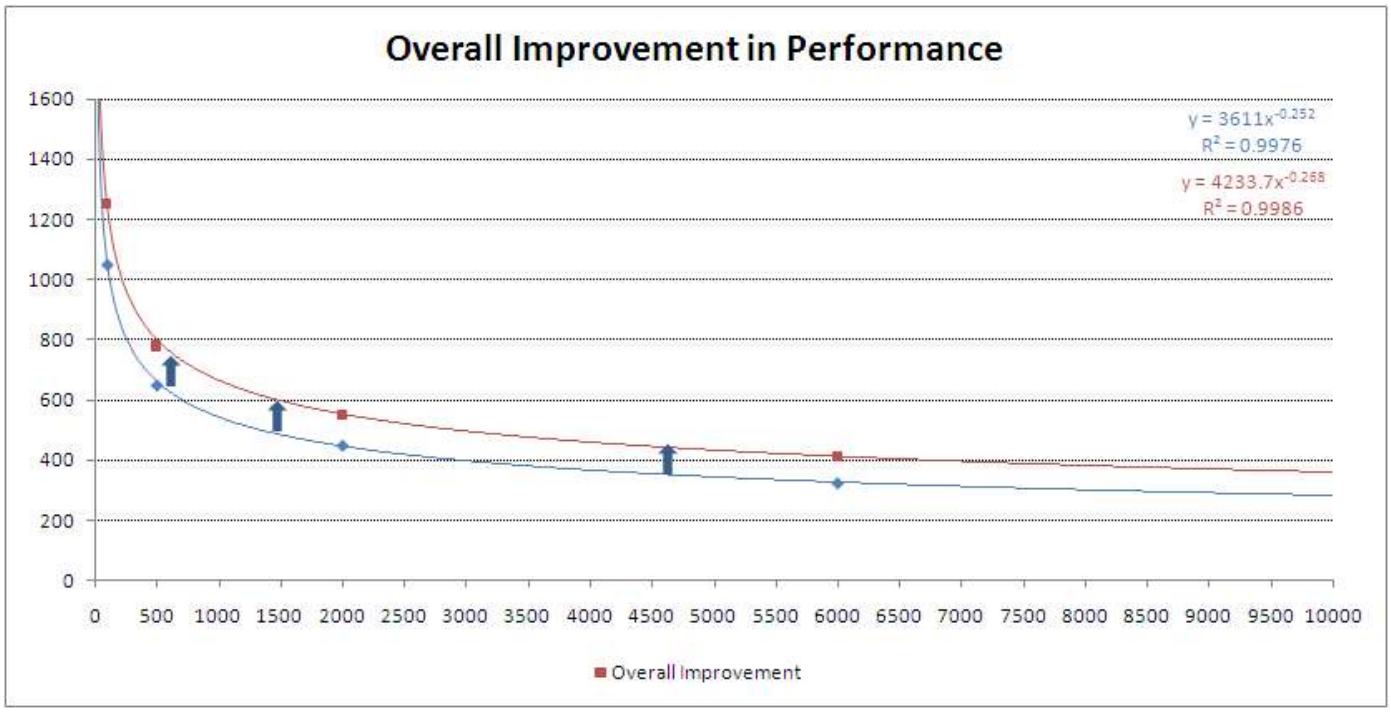


The analysis of the data obtained from a power / distance continuum can be very powerful as it can show how specific fitness traits can change with consistent and specific training but how these traits in some cases have only a small, if any, transfer to other distances (i.e. 100m improvement will have little effect on 6000m performance).

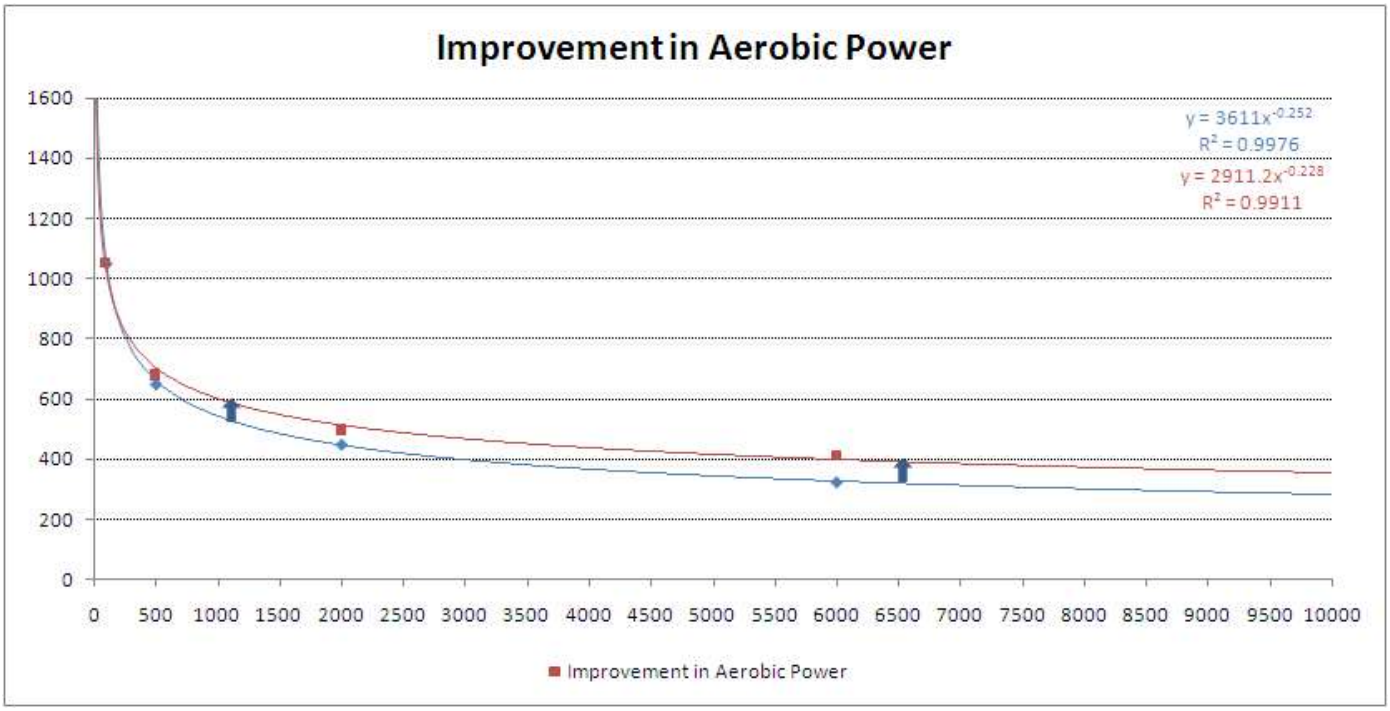


The energy supply continuum displaying the energy systems which are utilised across different ergometer distances

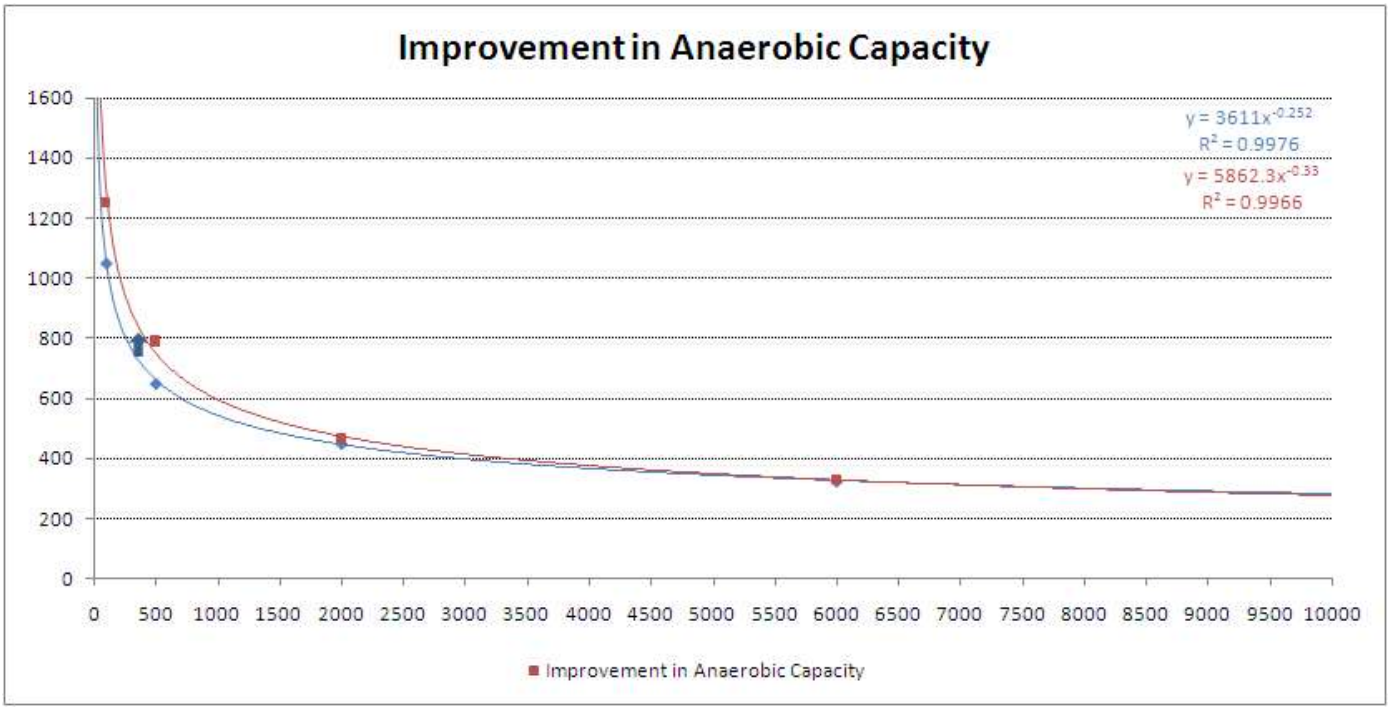
Consider the 3 examples below; the first graph shows an upward shift in the entire curve suggesting that all fitness traits (alactic, lactic and aerobic) have shown a significant improvement as a result of training.



In the next example there has been a greater upward shift in the longer distances than in the shorter distances suggesting an important improvement in aerobic and lactic energy systems but not so in the alactic. This may be representative of what Australia typically sees in the 1st phase of the domestic season (Sept to Jan).



In the final example there has been no shift in the medium and long distance power outputs but an important upward shift in the power outputs that can be exhibited over the shorter distances. This would suggest an improvement in alactic and lactic systems but no improvement in aerobic pathways. This example would represent improvements in rowing specific fitness that we may see later in the international season although this is purely speculation as we rarely measure these variables at this time.



Given these examples, it is hopefully clear how regular measurement of ergometer performance of our rowers can guide and individualise training prescription and well as assist with evaluation of the success of a specific training block. Quite simply, the test battery does a simple strength and weakness assessment across the specific fitness traits required by rowers without the need to undertake laboratory tests or time out from the routine training environment. This battery can display changes that are expected to occur in a rower's fitness throughout both the domestic and international preparations. Importantly, the rower and coach can immediately gauge their progress and in turn design training cycles that can address weaknesses during the early phase of the season and enhance strengths later in the international season.