Mike Phillp July 2014

Selecting the Optimum Paddling Cadence

This document is an overview of a method for determining the stroke rate (cadence) at which a paddler develops their maximum power over a particular (sprint) race distance.

Overview

Typically paddlers migrate to a particular length of paddle based on a combination of advice from others (what is 'common' in their paddling group), and when they have gained more experience 'what feels right', plus hopefully guidance from their coach.

What has become apparent while working on a paddle design project in recent years is that many top level paddlers are relying on this subjective approach. This process may not necessarily result in the paddler generating the maximum power they might during racing!

The concept of requiring to be in the 'correct gear' to achieve maximum power (hence speed) over a particular distance, is probably easiest to appreciate when considering cycling. Many of us have experience of cycling on a multi-geared bike and feeling the difference relatively small changes of gearing make to our ability to work flat out. Observing the cycle speedo makes it easy to check our subjective feelings against what is really happening.

In canoeing the 'gearing' experienced by the paddler can be adjusted either by changing the length of the paddle shaft, or by changing the size of the paddle blade.

The now common use of adjustable length paddles has made it much easier for paddlers to experiment in this area. But getting consistent conditions during testing, and issues associated with the familiarisation period required when using different length paddles can mask the differences we're trying to measure.

This type of investigation is where a paddling ergo comes into its own. Coming 'indoors' immediately removes wind and water conditions from the investigation, plus (in this case) perhaps the most important issue, removing what would be the 'variable' of the paddler getting used to the 'feel' of the paddle tip striking the water slightly earlier or later in the stroke than they are used too.

Suggested Testing Process

The procedure described gives the 'framework' for the testing process. Specific test duration, rest periods, and number of repetitions would best be decided by the particular paddler's coaching team, (to allow for minimising 'fatigue effects' etc).

In this example a Lawler ergo with PaddleMonitor software (running on a separate laptop), and an adjustable length shaft is used.

It is preferred to change the load using an adjustable paddle shaft rather than changing airflow through the flywheel (as is typical on a number of popular paddling ergos). Although the measurement of power output (and hence speed readings) is automatically adjusted on these 'popular' ergos, by allowing for differing airflow, the kinetic energy stored in the flywheel for a particular power reading will vary (with differing airflows), giving slightly different paddling characteristics during the testing.

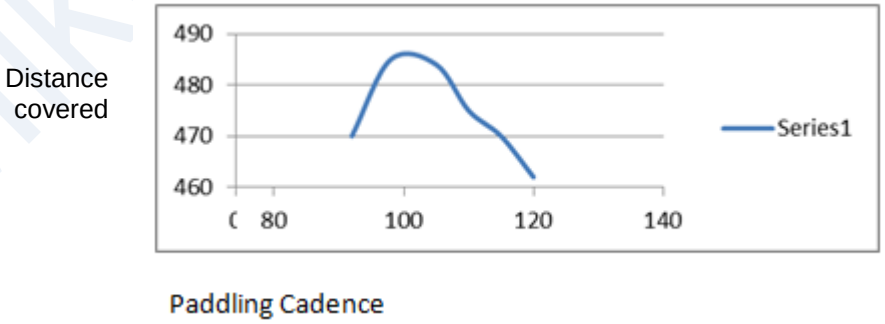
For the test itself, the subject is asked to adjust the paddle length until the load/cadence (paddling for the time it normally takes them to paddle the relevant race distance, or as decided by the coach) feels similar to that experienced when paddling their K1.

The paddler is then required to repeat the test for the required time for a number of repetitions, to establish a baseline for subsequent testing

To eliminate speed differences at the immediate beginning of the test due to the different gearing (for the first couple of seconds low gearing would be good, high gearing bad) something like a 15 second 'run in' to the test is suggested. This lets the paddler move from 'fast cruise' to 'race' as the coach calls go. (Checking the implications of different gearing in the first couple of seconds is a different investigation!)

For the actual testing it is suggested a minimum of seven different shaft lengths (3 longer, 3 shorter, plus 'baseline') would be required, to produce a reasonable graph of power against paddle length. As with most investigations the more 'data points' generated the more reliable the results. (But this needs to be balanced against 'fatigue effects', impact on paddler's training plan etc).

The results of distance covered against stroke rate are plotted on a graph. The high point of the graph indicating the best cadence for this particular paddler over this particular distance / time (around 100 strokes/min for this paddler).



If the graph doesn't 'peak' but just slopes up or down, the test needs to be repeated shifting the range of shaft lengths in the appropriate direction.

Finally the paddler gets back into a boat (at last!) and over a number of runs replicating the ergo testing, adjusts the length of the paddle until they match their 'best' cadence.