

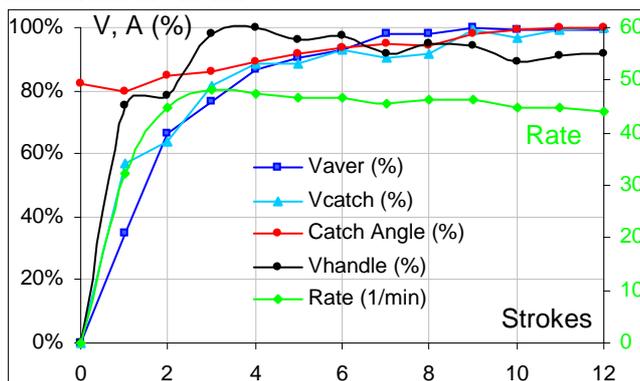
Q&A

Q: *Aj Harper, a coach of the high performance regional program in New Zealand asked: "Have you any information on the best possible racing start for a boat/types? Most people I speak to tend to use the basic, full, half, three quarter, full scenario. However I was speaking to someone the other day who suggested just full strokes only is the way to go."*

A: Definitely, doing full strokes is not the best way to do starts for the following reasons:

- The gear ratio is higher (heavier) with a long catch angle (RBN 2007/03), which makes rowers work in a slow, static and inefficient mode.
- The hydro-lift effect doesn't work at low boat speeds (RBN 2007/12), so pushing the blade outwards at the catch increases its slippage through the water and amount of energy wasted.

To evaluate correlation of the catch angle with the boat velocity we have analysed a start of an international level crew:



The average boat velocity over the stroke cycle **Vaver** achieved 90% of its maximal value at the 5th stroke, 98% at the 7th and 100% at the 9th stroke. The boat velocity at the catch **Vcatch** is not the same as **Vaver** because the speed varies during the stroke cycle. The most significant difference was after the first stroke, because there was the highest variation of the boat velocity from the stationary position. We used **Vcatch** for further calculations because it defines the interaction of the blade with the water at the catch.

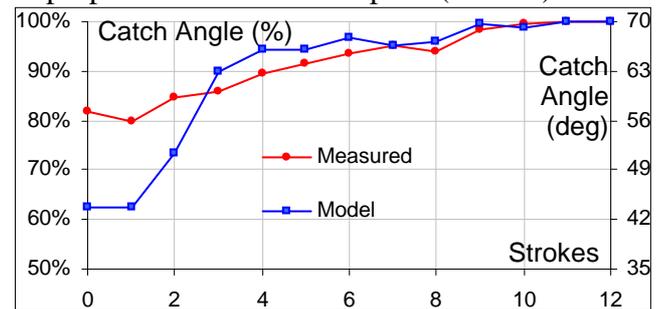
The catch angles were approximately 80% of the maximal value during the first three strokes. Then the length increased gradually and reached its maximum in the same stroke (the 9th) as the boat speed.

When we divided **Vcatch** by the actual gearing ratio derived using the catch angle (RBN 2007/03), we obtained the corresponding handle speed,

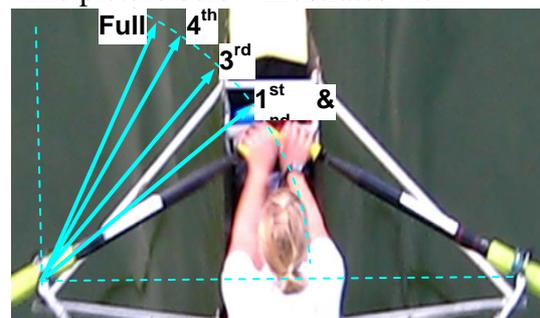
Vhandle, which was significantly lower during the first two strokes. This means the rower had to work in a slow, heavy mode, which decreased the boat acceleration and muscle efficiency.

We made the hypothesis that maintaining a more even actual gearing may increase the efficiency of the start. In simpler words, it means that the catch angle should increase proportionally with the boat speed during the start. What sort of angle should a given crew use in this case?

The chart below shows the measured angles from the previous chart and modeled angles, which are proportional to the boat speed (**Vcatch**):



At the catch of the first stroke the boat speed is zero, so we assumed its angle would be equal to the angle at the second catch. The optimal sequence is the following: the 1st and 2nd strokes – 62% of the full catch angle, the 3rd – 73%, the 4th – 90% and then gradually increasing to 100% at the 9th stroke. To give you some numbers in degrees we put them on the right Y axis, assuming the full catch angle is 70 deg. What should these angles look like in a boat? The picture below illustrates them:



The first two catches should be made with the handle position above the toes of the stretcher, so-called "half slide"; the 3rd catch – "three quarters slide", the 4th – about 10cm shorter than the full length, which should be achieved by the 9th stroke.

The hypothesis needs to be proved in practise by means of analysis of various start techniques. Also, blade slippage and hydro-lift effect should be considered. We hope to do it in the future.

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