Steps 1-3 Protocol

(version 22/4/2020)

Step 1

1) To make sure the videos are in a quality that allows precise measurements:

- **Use a camera with at least 60fps**

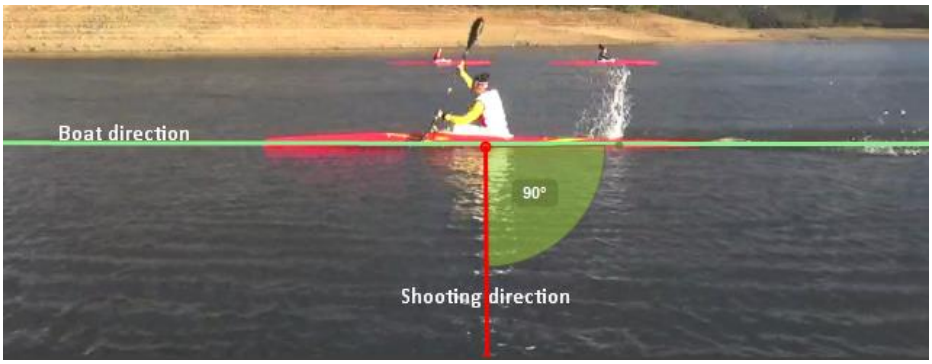
Already some smartphones have the option for this level of frames per second. This will allow us a much higher accuracy in measuring the necessary data from the video.

- **The camera/phone should be positioned on land or other completely stable surface and sit completely still**

Ideally you should use a tripod. Any camera movements during shooting can cause errors in measurements. If possible the camera/phone should be at approx. head height of the athlete tested.

- **The camera should be filming at an exact angle of 90 degrees to the direction of the boat.**

You should ensure the boat directions are always at the 90 degrees angle for the complete duration of each passage. This will assure the measured angles and lengths are correct. Position the camera at a correct angle as well as making sure the athletes paddle in the correct direction.



- **The distance of the boat from the camera should be such, for the camera to capture 3 single strokes on the camera side.**

More strokes on the camera side mean the boat was too far, unless you have a high-resolution camera (in this case the distance will increase the accuracy). Less than 3 strokes on the camera side in the shot means the athlete was too close and we might not be able to measure all the necessary parameters. Always use the highest resolution possible!

2) Make sure the outside conditions are good – so the results can be compared between different tests:

- Perform all the passages in the same direction.
- If filming more athletes make sure the water calms down before the next athlete passes the camera.
- There must be no current present.
- If possible, no wind and no waves.

3) After the test make sure to:

- **Name the video clips using name, date and the number of passage (to avoid confusion and mistakes, as well as speed up the process)**

  eg.: Tom Taylor 23042020 – speed 1

- **Note the following details (so we can consider it during data interpretation):**
  - Air temperature
  - Water temperature
  - General conditions
  - Athlete weight

- **If possible please also note (so we know the details when comparing future tests where the setup might change):**
  - Paddle: model, length, size, angle
  - Boat: model, size, footrest position, seat position and height
  - In the case of Paracanoeing: note any details in setup, equipment or athlete's preparedness that might change with time

- **Note what fps was used for filming!**

4) Depending on the goal of the Step1 test we shall film:

- **To compare technique parameters at different speeds film:**
  - 3 steps: aerobic 2km pace, 500m pace and 200m pace OR max speed
  - 4 steps: aerobic endurance pace, 1000m pace, 500 OR 200m pace, max speed
  - 5 steps: aerobic endurance pace, 1000m pace, 500m pace, 200m pace, max speed

- **To compare parameters using different equipment film:**
  - 1-3 passages using equipment setup A
  - 1-3 passages using equipment setup B (at same paces as A)

- **To study the influence of tiredness or other factors on technique film either:**
  - various parts of the race (using the protocol described above)
  - the athlete in various moments of the same session, possibly at similar speed or during a similar task (using the protocol described above)

Step 2

Step2 shots are not standardized in advance like the shots necessary for Step1 test.

If we are just exploring an athlete's technique any good shots might come useful. Particularly the ones shot at a steady angle:

- From a motorboat driving at the same speed as the athlete shooting from the side.
- From a motorboat driving at the same speed as the athlete shooting from behind (ideally from the middle axis of the boat).
- Frontal shot of the paddler from land.
- Back shot of the paddler from land.
- Top shot of a paddler taken from above (bridge).
- Drone options (!?)

If we have already a clear idea of what detail of the paddler's technique we need to understand better, we will also need one of the above shots. It is always very useful to use a camera with at least 60fps.

Step3 (H-graph) test PROTOCOL

The H-graph depicts the connection between boat speed, stroke rate, distance per stroke and Netto stroke energy. **The H-graph is normally plotted for either:**

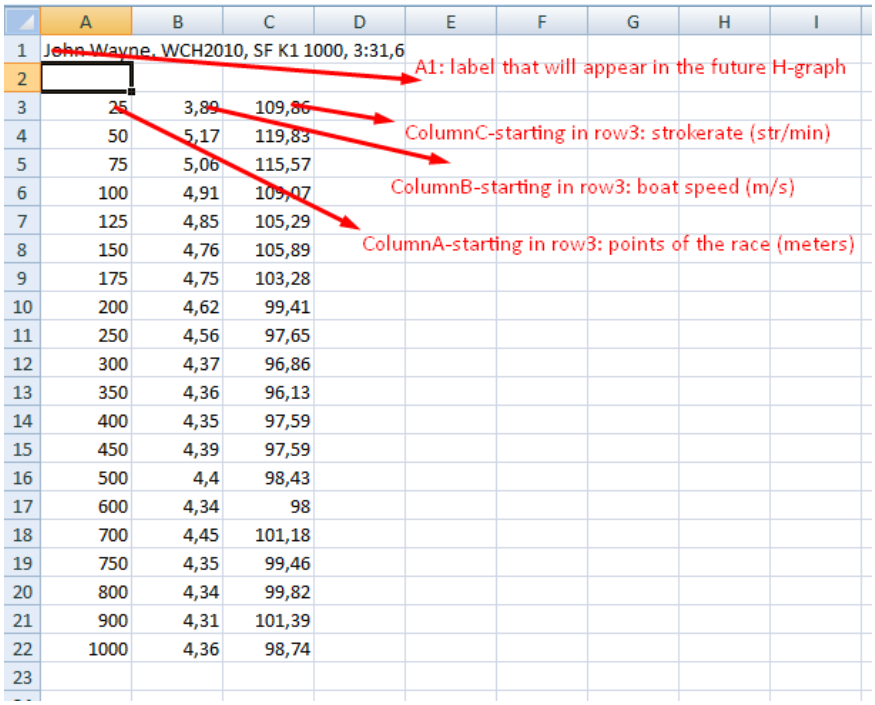
- a race performance
- a training race simulation or parts of a race simulation
- single dots from the Step1 test can be inserted in the H-graph as well
- any set, rep or part of a session

For us to design an H-graph with our software, we need accurate data about boat speed and stroke rate. **For whatever setup you are using to collect these data (smart watch + Vaaka, various trackers, manually from video) please make sure that:**

- send us raw data (no filters, no averages)
- data from every 10m seems optimal (not less)
- both speed and distance per stroke with at least 2 decimal points (see example below)

For us to be able to import your data in our software the Excel file you send us must be organised as follows:

- Cell A1: the label that will appear in the future graph (what data is being plotted)
- Second row: empty
- Column A – starting in row 3: points of the race (meters)
- Column B – starting in row 2: boat speed (meters/second)
- Column C – starting in row 3: stroke rate (strokes/minute)



	A	B	C	D	E	F	G	H	I
1	John Wayne, WCH2010, SF K1 1000, 3:31,6								
2									
3	25	3,89	109,86						
4	50	5,17	119,83						
5	75	5,06	115,57						
6	100	4,91	109,07						
7	125	4,85	105,29						
8	150	4,76	105,89						
9	175	4,75	103,28						
10	200	4,62	99,41						
11	250	4,56	97,65						
12	300	4,37	96,86						
13	350	4,36	96,13						
14	400	4,35	97,59						
15	450	4,39	97,59						
16	500	4,4	98,43						
17	600	4,34	98						
18	700	4,45	101,18						
19	750	4,35	99,46						
20	800	4,34	99,82						
21	900	4,31	101,39						
22	1000	4,36	98,74						
23									