

Q&A

Q: *Torsten Heycke, a member of the Ashland Rowing Club, Oregon asked us if we “can estimate/measure or model an uneven application of power in a sculler's two oars and express this in some meaningful equation (or even an English sentence)... e.g., a stern wiggle by a single sculler of 3 centimeters and back translates into x number of lost watts and y number of lost seconds over a 2000-meter course”*

A: Unfortunately, not all questions can be answered with the currently available data and knowledge. If we try to answer this question empirically, how should we run an experiment to measure it? Asking the same sculler to scull symmetrically and asymmetrically? However, it is very likely that he will be at his most efficient in his usual mode. If we compare different crews (symmetrical with asymmetrical) then many other factors would affect efficiency (force profile, stroke length, etc.). The main problem such experiments is the effect of weather conditions, which affect boat speed and efficiency much more than changes in rowing technique.

We asked Marinus van Holst if it is possible to model this issue. Marinus kindly supplied results which show a very small effect of asymmetrical force application; for a stern wiggle of 3cm the losses were found to be 0.1% of the power and 0.033% of the speed, which equates to 0.12s over a 2k race. These numbers are approximate because there are unknown factors in the modelling equations, such as drag factors for the hull at various angles of attack relative to the stream. Again, to obtain them we need to run on-water experiments.

Concluding, common sense tells us that it is obviously better to scull symmetrically, but currently we can't reliably evaluate the effect of the boat wiggle caused by asymmetrical force application. Do we really need to do it?

Q: *We have received positive feedback on the previous Newsletter with prognostic speed for U23 and junior crews. A number of coaches asked about normative data for the handle force and rowing angles for younger crews.*

A: The target boat speed was taken from the previous Newsletter. The modelling method published in RBN 2007/08 was used to derive force. Lower values for body weight were used for younger rowers, which affected very slightly the drag factor (RBN 2009/02). On average, the required power production was found to be 10.2% lower in the U23 category and 14.8% lower for juniors. It is logical to assume that younger rowers would use a lower racing rate and shorter angles, so in the model we decreased them proportionally

by 1.5% for the U23 category and by 2.4% for juniors. The normative data is shown in the tables below:

Open Category

Boat	Time	W (kg)	Rate (1/min)	P (W)	Angle (deg)	F _{max} (kgF)	F _{aver} (kgF)
W1x	7:11.5	85	34.1	399	107	72.8	37.9
W2x	6:39.5	80	35.9	387	107	67.2	34.9
W4x	6:08.5	80	37.4	399	110	66.6	34.6
W2-	6:52.9	85	37.4	396	87	66.0	34.3
W8+	5:53.1	80	39.1	405	89	64.6	33.6
M1x	6:32.5	95	36.3	556	112	90.4	47.0
M2x	6:02.1	90	38.2	546	113	84.5	43.9
M4x	5:33.2	90	39.3	567	113	85.3	44.3
M2-	6:16.5	95	38.8	548	92	83.3	43.3
M4-	5:41.0	95	40.5	554	93	80.8	42.0
M8+	5:18.6	95	40.0	593	94	87.6	45.6
LW2x	6:47.0	60	36.1	330	99	62.0	32.2
LM2x	6:07.2	70	38.8	474	104	78.3	40.7
LM4-	5:46.2	70	40.6	469	86	74.0	38.5

U23 category

Boat	Time	W (kg)	Rate (1/min)	P (W)	Angle (deg)	F _{max} (kgF)	F _{aver} (kgF)
W1x	7:25.7	83	33.8	359	106	67.3	35.0
W2x	6:52.7	78	35.5	348	106	62.0	32.2
W4x	6:20.7	78	37.0	359	108	61.4	31.9
W2-	7:06.5	83	37.0	356	86	60.9	31.7
W8+	6:04.9	78	38.6	364	88	59.6	31.0
M1x	6:45.5	93	35.9	499	110	83.4	43.4
M2x	6:14.1	88	37.8	491	111	77.9	40.5
M4x	5:44.3	88	38.9	509	111	78.6	40.9
M2-	6:29.0	93	38.4	492	91	76.9	40.0
M4-	5:52.4	93	40.1	498	92	74.5	38.7
M8+	5:29.2	93	39.5	532	93	80.8	42.0
LW2x	7:00.4	60	35.7	300	99	56.9	29.6
LM2x	6:19.4	70	38.4	430	104	71.7	37.3
LM4-	5:57.7	70	40.1	425	86	67.8	35.3

Juniors

Boat	Time	W (kg)	Rate (1/min)	P (W)	Angle (deg)	F _{max} (kgF)	F _{aver} (kgF)
W1x	7:32.0	81	33.6	340	104	64.8	33.7
W2x	6:58.7	76	35.4	330	104	59.7	31.1
W4x	6:26.3	76	36.8	340	107	59.2	30.8
W2-	7:12.6	81	36.8	338	85	58.7	30.5
W8+	6:10.2	76	38.5	345	87	57.4	29.8
M1x	6:51.4	91	35.8	474	109	80.3	41.8
M2x	6:19.6	86	37.6	465	110	75.0	39.0
M4x	5:49.4	86	38.7	483	110	75.6	39.3
M2-	6:34.6	91	38.2	467	90	74.1	38.5
M4-	5:57.6	91	39.9	472	91	71.7	37.3
M8+	5:34.1	91	39.4	504	92	77.7	40.4

On average, to achieve their targets, **U23 rowers should apply 7.4% lower force than adult and juniors should pull 10.2% less.** These values can be used in strength training and testing, but they are valid for stated combination of stroke rate and angles. Obviously, it is possible to use various combinations, e.g. higher stroke rate at lower force or angles and vice-versa.

Would you like to measure force and angles for your crew? Contact us or choose the optimal solution on our web site.

Contact Us:

✉ ©2009: Dr. Valery Kleshnev,
kleva1@btinternet.com , www.biorow.com