

Facts. Did you know that...

...a rigging survey was conducted as a FISA project during the last World Championship in Eton? Here we will give some analysis of the oar/scull gearing. The table below shows the average, minimum and maximum values of the inboard and oar length, measured in 620 oars and sculls in the 14 Olympic boat classes:

Boat	N	Inboard (cm)			Oar Length (cm)		
		Aver.	Min	Max	Aver.	Min	Max
M1X	17	88.9	87.5	91.0	289.5	287.5	293.2
LM2X	46	88.2	87.2	89.0	288.3	284.0	290.0
M2X	42	88.3	87.4	90.0	289.8	288.0	291.0
M4X	60	88.0	86.8	90.0	290.8	287.7	293.0
W1X	15	88.2	86.8	89.0	288.0	285.5	290.0
LW2X	32	88.2	86.5	90.5	291.5	280.8	368.0
W2X	24	88.3	87.5	89.0	288.1	286.0	290.0
W4X	28	87.5	86.0	88.3	288.6	287.0	291.0
M2-	26	116.3	116.0	117.5	376.4	374.0	379.0
LM4-	64	115.2	114.0	116.0	374.3	368.0	377.0
M4-	64	115.1	114.0	116.5	375.3	370.0	377.5
M8+	104	113.8	113.0	115.0	376.1	375.0	377.5
W2-	18	116.4	116.0	117.0	373.1	371.0	374.5
W8+	80	114.6	113.5	116.0	373.7	371.5	375.5

We derive the actual gearing ratio using inboard *Inb* and outboard *Out* in the equation:

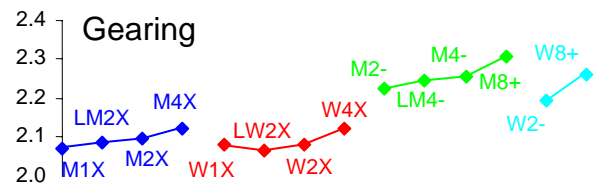
$$G = (Out.-SL/2- SW/2) / (Inb.-Hnd/2+SW/2)$$

where *Hnd* is the handle width (12cm in sculls and 30cm in sweep oars), *SW* is the swivel width (ie thickness, 4cm) and *SL* is the spoon length (measured for each oar). If we divide average speed of the boat by the gearing, then the value will reflect the average speed of the handle during the drive. In fact, the actual average speed is different because of two factors: circular motion of the handle (increases the estimate by 10-20% depending on the oar angles) and slippage of the blade in the water (decreases the estimate by 15-18% depending on the boat type and external resistance). These two factors more or less compensate for each other, so the actual average speed of the handle must be quite close to the values below:

Boat	Gearing (Inboard/Outboard)			Average Handle Speed (m/s)		
	Aver.	Min	Max	Aver.	Min	Max
M1X	2.074	2.037	2.142	2.31	2.13	2.44
LM2X	2.085	2.036	2.113	2.44	2.20	2.59
M2X	2.098	2.035	2.154	2.50	2.25	2.64
M4X	2.125	2.070	2.162	2.67	2.50	2.85
W1X	2.084	2.040	2.112	2.09	1.87	2.20
LW2X	2.067	1.991	2.138	2.16	1.92	2.33
W2X	2.084	2.037	2.121	2.30	2.16	2.37
W4X	2.121	2.093	2.159	2.49	2.42	2.56
M2-	2.228	2.206	2.249	2.27	1.97	2.35
LM4-	2.248	2.160	2.298	2.38	2.20	2.53
M4-	2.258	2.215	2.307	2.49	2.29	2.59
M8+	2.307	2.262	2.345	2.54	2.42	2.66
W2-	2.196	2.175	2.221	2.14	2.10	2.21
W8+	2.264	2.211	2.300	2.39	2.35	2.45

We notice that in all categories the gearing increases in bigger boats, except women's sculling.

There was a bit lighter gearing in the LW2x than in W1x:

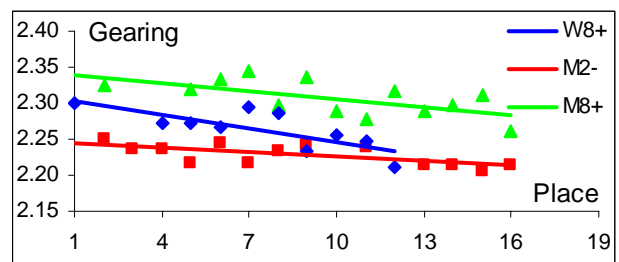


The difference in gearing between faster and slower boats does not compensate for the difference in boat speed: on average, M4x had 13.4% faster handle speed than M1x; W4x had 16.1% faster handle speed than W1x, and both M8+ and W8+ had 10.6% faster handle speed than M2- and W2-, respectively. These differences are less than differences in the stroke rate (RBN 2003/01), which were 10.2%, 9.7%, 4.6% and 5.6%, correspondingly. This means that rowers in big boats either use longer oar angles or have a relatively shorter ratio of the drive time.

The table below represents the correlation between gearing and the final place of the crew:

M1x	LM2x	M2x	M4x	W1x	LW2x	W2x
-0.04	-0.16	0.15	-0.22	-0.22	-0.27	0.08
W4x	M2-	LM4-	M4-	M8+	W2-	W8+
-0.08	-0.45	-0.22	-0.06	-0.40	-0.23	-0.21

There was quite a significant negative correlation in M2-, M8+ and W8+ means that the better performers usually had heavier gearing. M2x and W2x were the only classes with a small opposite correlation.



Some countries had heavier gearings relative to the average for the boat class (IRL +1.08%, RSA and CAN +0.71%) and others had lighter gearings (SVK -1.05%, UKR -0.97%, ITA 0.60%).

In 14 Olympic events, 65.0% of all oars/sculls (64.0% of the crews) were made by Concept-II, 29.0% (28.1%) by Croker, 5.3% (6.9%) by Empacher and 0.6% (1.0%) by other manufacturers. 53.4% of all oars/sculls were smoothie, 33.6% - standard big blade with a rib, 8.2% - "slick". 16.0% of all oars/sculls had the Vortex strip.

Contact Us:

✉ ©2006 Dr. Valery Kleshnev, EIS, Bisham Abbey www.biorow.com e-mail: kleva@btinternet.com