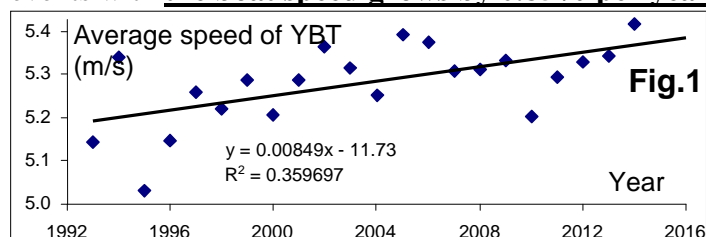


## News

The World Rowing Championship 2014 has just finished in Amsterdam. Seven medals were won by BioRow clients: 3 gold (LM4- DEN, M4x UKR, LM2-SUI), 1 silver (W4x CHN) and 3 bronze (LM2x NOR, W8+ CHN, LM1x SUI). Congratulations to the rowers and coaches! Well done!

### Trends of boat speed and stroke rate

During World championships 2014 in Amsterdam, strong tail wind with warm and not very rough water helped to set 14 new World best times (WBT), 8 of them in Olympic events. This makes it the fastest Worlds regatta in the Rowing history. Fig.1 shows the trend of the Yearly Best Times (YBT) in 14 Olympic events with **the boat speed grows by 0.85% per year**.



After London - 2012 Olympics, we made analysis of the boat speed trends (RBN 2012/08) and derived the year of expected new WBT. All four WBT expected in 2015-16 were renewed: three of them this year (LM4-, LW2x and LM2x), and one (W8+) was renewed last year. Also, there were renewed WBT expected much later: in M2x (expected in 2029), W2x (2027) and W4x (2024). The table below shows the best times this year (BT 2014, new WBT is in bold), difference from the previous WBT ("-“ is faster, "+" is slower), growth (% per year) based on 1993-2014 data, prognostic times for 2016 based on the trend lines and the year of expected new WBT.

Event	BT 2014	T2014-WBT	Growth	GT2016	New WBT
W8+	05:56.8	+2.7	1.54%	05:53.9	2016
M8+	05:24.1	+4.8	1.28%	05:20.4	2015
LM4-	<b>05:43.2</b>	-2.4	1.27%	05:45.3	2019
M4x	<b>05:32.3</b>	-0.9	1.21%	05:34.2	2019
LW2x	<b>06:48.6</b>	-0.9	0.95%	06:48.3	2016
M2-	06:09.3	+0.8	0.94%	06:12.4	2022
LM2x	<b>06:05.4</b>	-4.7	0.89%	06:08.9	2022
M4-	05:40.2	+2.4	0.82%	05:44.1	2024
W2-	<b>06:50.6</b>	-3.2	0.71%	06:55.1	2023
W4x	<b>06:06.8</b>	-2.5	0.65%	06:12.4	2028
M1x	06:37.1	+3.8	0.65%	06:35.6	2028
W2x	<b>06:37.1</b>	-1.7	0.64%	06:41.6	2025
M2x	<b>05:59.7</b>	-3.5	0.61%	06:06.0	2032
W1x	07:15.0	+7.2	0.42%	07:14.9	2035
<b>Average</b>		<b>+0.13</b>	<b>0.85%</b>		

As before, **the biggest growth 1.3-1.5% per year was found in both men's and women's eights**, where new WBT is expected within the next two years. Probably, the reason was a better organisation of the training in the leading teams, which allows to prepare more rowers at higher standards. **Small sculling boats have**

**the slowest growth 0.4-0.6%**, which would forecast a new WBT in 15-20 years from now. Probably, individual events are closer to limits of performance in our sport. Even fantastic new WBT of Croatian men's double (5:59.7, 3.5s faster than the previous WBT) and new WBT in W2x haven't changed the trends. The biggest progress of WBT 4.7s was achieved in LM2x, and it also was very significant in W2- (3.2s), W4x (2.5s) and LM4- (2.4s).

Analysis of GPS data has shown that the average stroke rate in 14 Olympic boats was 37.7 min<sup>-1</sup>, which is slightly higher than in 2010 (37.1) and 2004 (37.3), but lower than in 2002 (38.1) and 2000 (38.3). This means there is no clear trend, so **the stroke rate does not vary significantly over the years**. The following table shows average stroke rates over 2km in finalists:

Boat	Gold	Silver	Bronze	4 <sup>th</sup>	5 <sup>th</sup>	6 <sup>th</sup>	Av.
LM2x	38.8	38.1	37.1	39.6	39.2	37.3	38.4
LM4-	40.7	39.9	39.7	39.7	39.8	40.3	40.0
LW2x	36.1	34.4	38.0	36.0	36.9	38.2	36.6
M1x	36.0	33.5	35.7	34.0	34.2	35.8	34.9
M2-	40.2	39.4	38.6	38.9	38.0	37.6	38.8
M2x	37.9	40.4	38.6	38.4	38.1	38.0	38.6
M4-	39.7	39.2	39.8	39.9	38.5	39.7	39.4
M4x	36.7	38.9	37.8	39.8	36.9	37.4	37.9
M8+	39.2	40.0	40.1	40.4	39.8	40.1	39.9
W1x	33.9	34.2	31.3	33.3	33.8	32.9	33.2
W2-	37.1	36.3	38.9	36.2	37.6	36.5	37.1
W2x	37.0	36.2	39.9	37.7	35.8	37.7	37.4
W4x	36.6	39.1	37.2	37.7	37.1	35.8	37.2
W8+	36.5	38.4	39.4	38.3	36.0	39.0	37.9
<b>Aver.</b>	<b>37.6</b>	<b>37.7</b>	<b>38.0</b>	<b>37.8</b>	<b>37.3</b>	<b>37.6</b>	<b>37.7</b>

**No statistically significant difference was found in average stroke rate between finalists**. The next table shows relative effective Work per Stroke (eWPS, RBN 2005/10) in all finalists:

Boat	Gold	Silver	Bronze	4 <sup>th</sup>	5 <sup>th</sup>	6 <sup>th</sup>
LM2x	3.2%	3.9%	7.2%	-2.5%	-6.0%	-5.0%
LM4-	2.7%	2.6%	2.2%	2.5%	-2.7%	-7.0%
LW2x	5.2%	8.3%	-3.5%	1.7%	-2.7%	-7.8%
M1x	2.5%	11.3%	-1.4%	1.3%	-1.7%	-10.8%
M2-	5.3%	3.0%	2.1%	-2.9%	-2.1%	-5.2%
M2x	5.6%	-3.7%	0.7%	1.0%	0.9%	-4.2%
M4-	5.7%	4.5%	2.7%	0.3%	-2.6%	-10.0%
M4x	8.2%	1.9%	1.5%	-4.9%	0.4%	-6.2%
M8+	6.2%	3.6%	1.4%	-1.8%	-3.2%	-5.7%
W1x	4.4%	1.8%	7.8%	0.6%	-7.1%	-6.5%
W2-	6.8%	5.7%	-2.8%	1.5%	-5.8%	-4.7%
W2x	5.3%	5.7%	-4.8%	-2.1%	1.2%	-4.5%
W4x	7.1%	-3.1%	1.0%	-3.0%	-2.3%	0.7%
W8+	9.1%	2.1%	-2.4%	-1.9%	1.8%	-7.7%
<b>Aver.</b>	<b>5.5%</b>	<b>3.4%</b>	<b>0.8%</b>	<b>-0.7%</b>	<b>-2.3%</b>	<b>-6.0%</b>

On average, **the races were won by higher effective Work per Stroke: every one higher place "cost" about 2% of higher eWPS**. However, there were some exceptions: in LM2x, LW2x, M1x and W1x the winners had higher stroke rate, but lower eWPS than some medallists.