

### Forse sapevi che...

✓ ...analisi della frequenza colpi durante i Olympic Games-2004 in Athens come già effettuata per OG-2000 e WC-2002 (RBN 1,2/2003). Le misurazioni sono fatte solo per le medaglie oro utilizzando I video ufficiali. È stato misurato circa il 70% del totale numero colpi. I dati sono filtrati e comparati con official split e tempi finali.

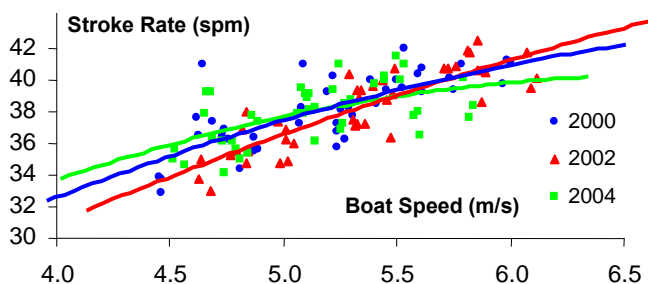
✓ ...la media colpi delle medaglie (winners) negli ultimi Olympics era 37.86spm. Lo stesso parametro nei Olympics-2000 era 38.07spm, e nei Worlds-2002 era 38.19spm. Così, possiamo vedere un piccolo decremento nella media della frequenza colpi;

✓ ... dal 2000-2 la media frequenza(stroke rate) è incrementata nelle small boats: singolo, doppio e 2-, eccetto nel LW2x. Medal winners nelle big barca (4x,4+ e 8+) hanno un inferiore stroke rate.

### Media stroke rate sui 2000m dei medagliati dei OG-2000, WC-2002 e OG-2004.

	W1x	M1x	W2-	M2-	W2x	M2x	M4-
2000	33.5	35.9	38.4	38.8	35.8	38.0	40.1
2002	33.9	36.4	36.2	38.6	35.7	38.3	41.7
2004	35.0	36.7	37.6	39.1	36.3	38.3	39.8
	LW2x	LM2x	LM4-	W4x	M4x	W8+	M8+
2000	36.8	38.9	40.5	36.2	40.2	39.3	40.7
2002	35.7	38.6	40.8	38.4	40.3	39.7	40.4
2004	35.9	38.9	40.4	37.5	37.4	38.2	38.8

✓ ...il precedente dato influenza la linea di trend del Rate/Velocità ratio, quale diventa elevata per velocità basse (small boats) e bassa per elevate velocità (big boats):

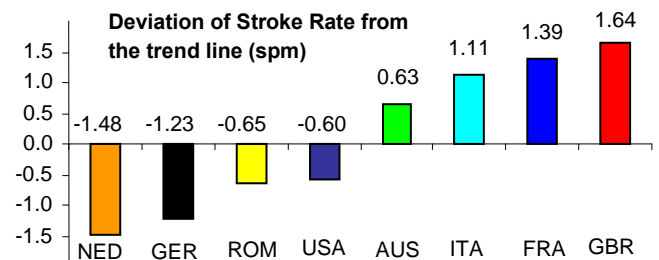


✓ ...I vincitori hanno una superiore variazione (rapporto tra la deviazione standard per la media nel corso di quattro sezioni di gara) del tasso di frequenza (5,1%), di argento (4,7%) e di bronzo medalists (4,0%). Questo ci dice che i vincitori hanno uno spunto ad alta velocità l'inizio e la fine della corsa, ma hanno un tasso inferiore di velocità di crociera;

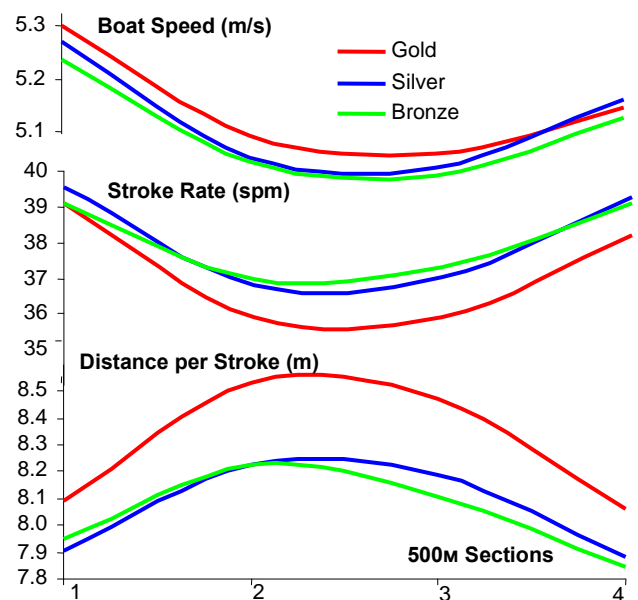
✓ ...in media, i winners hanno circa 1spm inferiore stroke rate (37.3) rispetto silver (38.3) e

bronze medalists (38.2). Questa differenza è evidente nei winners in LM2x (3.8spm inferiore than 2<sup>nd</sup> place e 2.6 spm inferiore 3<sup>rd</sup> place), W2- (2.5 e 1.4) e W2x (1.7 e 4.4);

✓ ...gli equipaggi dei principali paesi remieri hanno prestazioni differenti rispetto alla frequenza: NED, GER, ROM e USA normalmente hanno un stroke rate inferiore alla trend line, con lunghi DPS. GBR, FRA, ITA e AUS enfatizzano un elevata stroke rate e breve DPS.



✓ ...sotto il grafico della velocità barca, rate e DPS media nelle winners per ognuno delle 4 parti della gara:



È ovvio, che i vincitori hanno significativamente un elevato DPS, soprattutto al centro del campo di regata. È possibile trovare i dettagli della corsa tasso di analisi per ciascun vincitore della medaglia Appendice 1.

### References

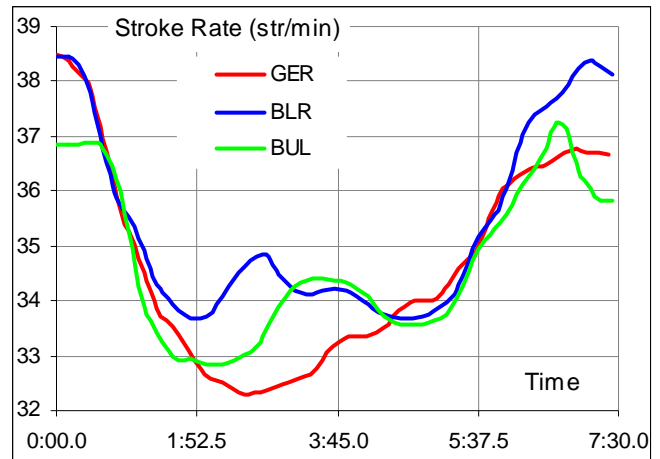
1. Kleshnev V. 2001. Stroke Rate vs. Distance in Rowing during the Sydney Olympics. Australian Rowing. 25(2), 18-21.

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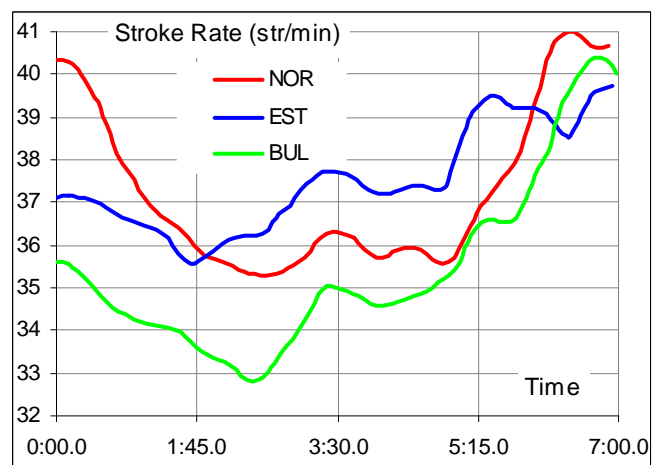
©2003 Dr. Valery Kleshnev, AIS/Biomechanics tel. (+61 2) 6214 1659, (m) 0413 223 290, fax: 6214 1593 e-mail: [kleshnev@ausport.gov.au](mailto:kleshnev@ausport.gov.au)

**Boat speed, stroke rate and distance per stroke in the medalists of the Olympic Games -2004 in Athens.**

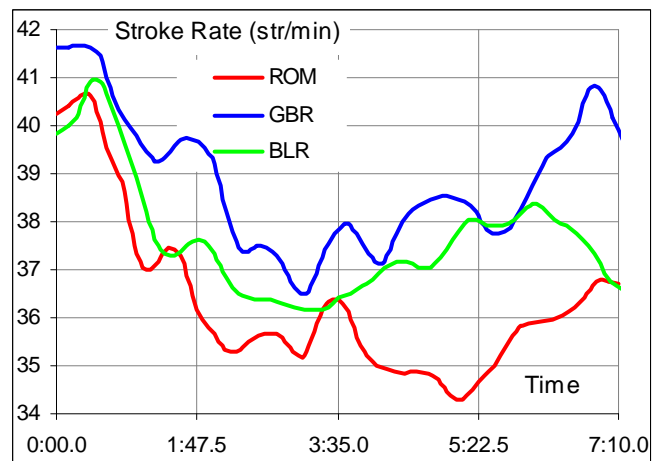
<b>W1x</b>		Speed over the 500m section (m:s)				
Crew		1	2	3	4	<b>2000</b>
1	GER	1:50.62	1:51.00	1:48.81	1:47.69	<b>7:18.12</b>
2	BLR	1:49.62	1:52.69	1:51.43	1:48.30	<b>7:22.04</b>
3	BUL	1:49.26	1:53.40	1:50.65	1:49.79	<b>7:23.10</b>
		Stroke Rate (str/min)				
1	GER	35.8	32.6	33.8	36.4	<b>34.6</b>
2	BLR	36.2	34.4	34.1	37.5	<b>35.5</b>
3	BUL	35.6	33.7	33.9	36.3	<b>34.9</b>
		Distance per Stroke (m)				
1	GER	7.58	8.29	8.15	7.66	<b>7.91</b>
2	BLR	7.57	7.75	7.90	7.39	<b>7.64</b>
3	BUL	7.72	7.84	7.99	7.53	<b>7.77</b>



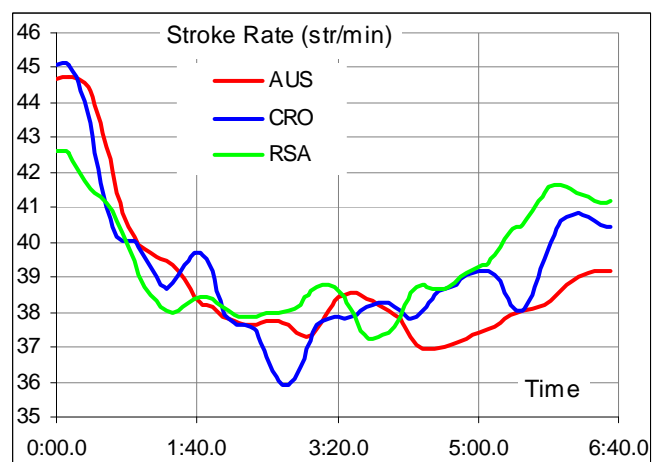
<b>M1x</b>		Speed over the 500m section (m:s)				
Crew		1	2	3	4	<b>2000</b>
1	NOR	1:41.77	1:43.63	1:43.02	1:40.88	<b>6:49.30</b>
2	EST	1:42.64	1:43.44	1:41.92	1:43.42	<b>6:51.42</b>
3	BUL	1:42.41	1:44.00	1:43.59	1:42.80	<b>6:52.80</b>
		Stroke Rate (str/min)				
1	NOR	38.0	35.7	35.9	39.5	<b>37.3</b>
2	EST	36.5	36.7	37.5	39.2	<b>37.5</b>
3	BUL	34.6	33.7	35.1	38.2	<b>35.4</b>
		Distance per Stroke (m)				
1	NOR	7.75	8.12	8.11	7.52	<b>7.86</b>
2	EST	8.02	7.90	7.85	7.40	<b>7.79</b>
3	BUL	8.48	8.57	8.25	7.63	<b>8.21</b>



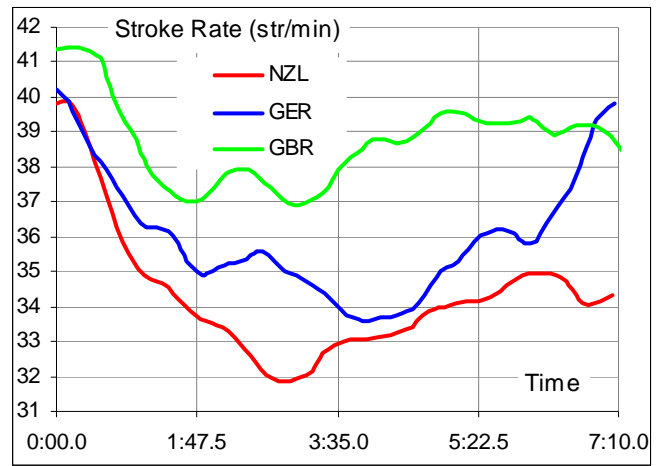
<b>W2-</b>		Speed over the 500m section (m:s)				
Crew		1	2	3	4	<b>2000</b>
1	ROM	1:44.03	1:45.60	1:48.46	1:48.46	<b>7:06.55</b>
2	GBR	1:44.53	1:48.45	1:49.99	1:45.69	<b>7:08.66</b>
3	BLR	1:44.21	1:47.67	1:50.18	1:47.80	<b>7:09.86</b>
		Stroke Rate (str/min)				
1	ROM	38.5	35.6	35.0	36.1	<b>36.3</b>
2	GBR	40.3	37.6	37.8	39.5	<b>38.8</b>
3	BLR	39.2	36.6	37.2	37.7	<b>37.7</b>
		Distance per Stroke (m)				
1	ROM	7.49	7.99	7.90	7.66	<b>7.75</b>
2	GBR	7.13	7.35	7.22	7.19	<b>7.22</b>
3	BLR	7.35	7.61	7.31	7.38	<b>7.41</b>



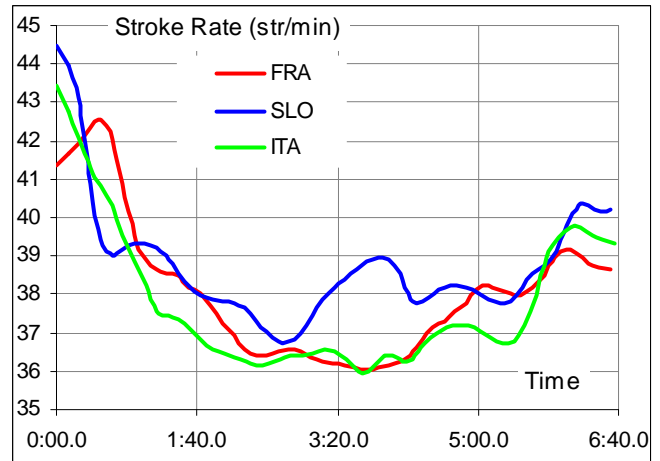
<b>M2-</b>		Speed over the 500m section (m:s)				
Crew		1	2	3	4	<b>2000</b>
1	AUS	1:34.68	1:39.37	1:39.03	1:37.68	<b>6:30.76</b>
2	CRO	1:35.57	1:40.09	1:39.69	1:37.29	<b>6:32.64</b>
3	RSA	1:36.93	1:40.06	1:39.75	1:36.66	<b>6:33.40</b>
		Stroke Rate (str/min)				
1	AUS	41.8	37.8	37.7	38.5	<b>38.9</b>
2	CRO	41.1	37.4	38.3	39.6	<b>39.1</b>
3	RSA	40.2	38.2	38.4	40.8	<b>39.4</b>
		Distance per Stroke (m)				
1	AUS	7.58	7.99	8.04	7.98	<b>7.89</b>
2	CRO	7.64	8.02	7.86	7.79	<b>7.82</b>
3	RSA	7.70	7.85	7.84	7.61	<b>7.75</b>



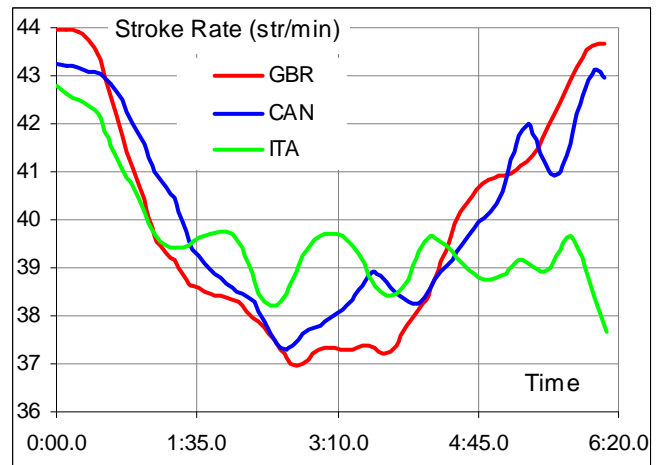
<b>W2x</b>		Speed over the 500m section (m:s)				
Crew		1	2	3	4	<b>2000</b>
1	NZL	1:40.89	1:46.17	1:46.72	1:48.01	<b>7:01.79</b>
2	GER	1:42.58	1:46.79	1:48.46	1:44.95	<b>7:02.78</b>
3	GBR	1:43.09	1:49.06	1:47.92	1:47.51	<b>7:07.58</b>
		Stroke Rate (str/min)				
1	NZL	36.4	32.9	33.4	34.4	<b>34.3</b>
2	GER	37.4	35.1	34.3	37.2	<b>36.0</b>
3	GBR	39.1	37.5	39.0	39.2	<b>38.7</b>
		Distance per Stroke (m)				
1	NZL	8.16	8.59	8.41	8.08	<b>8.30</b>
2	GER	7.82	8.01	8.06	7.68	<b>7.88</b>
3	GBR	7.44	7.34	7.13	7.12	<b>7.25</b>



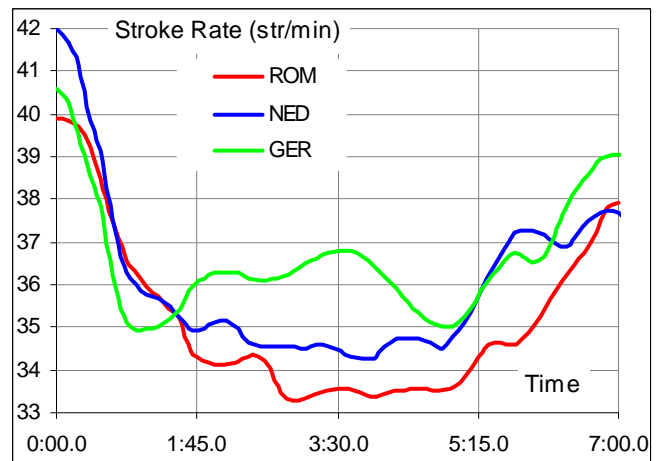
<b>M2x</b>		Speed over the 500m section (m:s)				
Crew		1	2	3	4	<b>2000</b>
1	FRA	1:33.63	1:38.83	1:39.85	1:36.69	<b>6:29.00</b>
2	SLO	1:33.99	1:38.75	1:39.90	1:39.08	<b>6:31.72</b>
3	ITA	1:32.58	1:38.16	1:41.20	1:40.99	<b>6:32.93</b>
		Stroke Rate (str/min)				
1	FRA	40.8	36.7	36.6	38.6	<b>38.1</b>
2	SLO	40.2	37.4	38.3	39.1	<b>38.7</b>
3	ITA	39.7	36.4	36.4	38.4	<b>37.7</b>
		Distance per Stroke (m)				
1	FRA	7.85	8.28	8.21	8.05	<b>8.09</b>
2	SLO	7.95	8.12	7.84	7.75	<b>7.91</b>
3	ITA	8.17	8.39	8.14	7.74	<b>8.10</b>



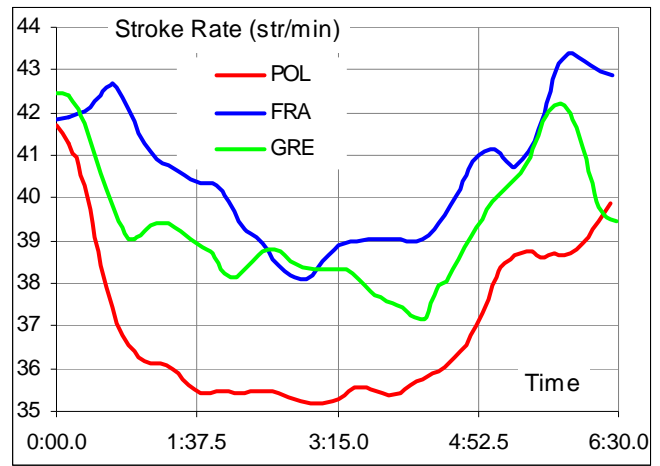
<b>M4-</b>		Speed over the 500m section (m:s)				
Crew		1	2	3	4	<b>2000</b>
1	GBR	1:28.00	1:33.68	1:35.04	1:30.26	<b>6:06.98</b>
2	CAN	1:28.41	1:33.71	1:34.09	1:30.85	<b>6:07.06</b>
3	ITA	1:31.00	1:33.35	1:33.05	1:33.01	<b>6:10.41</b>
		Stroke Rate (str/min)				
1	GBR	41.6	37.6	37.9	42.1	<b>39.8</b>
2	CAN	42.1	38.0	38.7	41.5	<b>40.1</b>
3	ITA	40.9	39.1	39.2	39.0	<b>39.5</b>
		Distance per Stroke (m)				
1	GBR	8.19	8.51	8.32	7.90	<b>8.21</b>
2	CAN	8.07	8.43	8.23	7.95	<b>8.16</b>
3	ITA	8.05	8.22	8.23	8.27	<b>8.19</b>



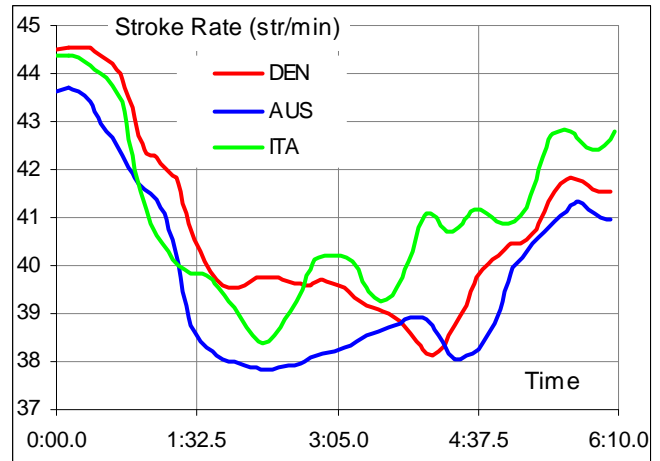
<b>LW2x</b>		Speed over the 500m section (m:s)				
Crew		1	2	3	4	<b>2000</b>
1	ROM	1:43.27	1:44.57	1:45.00	1:43.21	<b>6:56.05</b>
2	NED	1:41.84	1:45.36	1:47.86	1:42.27	<b>6:57.33</b>
3	GER	1:44.11	1:45.04	1:47.31	1:42.08	<b>6:58.54</b>
		Stroke Rate (str/min)				
1	ROM	37.3	33.8	33.6	35.9	<b>35.1</b>
2	NED	37.8	34.7	34.7	37.2	<b>36.1</b>
3	GER	36.8	36.4	35.8	37.4	<b>36.6</b>
		Distance per Stroke (m)				
1	ROM	7.78	8.50	8.51	8.10	<b>8.21</b>
2	NED	7.79	8.21	8.02	7.89	<b>7.97</b>
3	GER	7.82	7.85	7.82	7.86	<b>7.83</b>



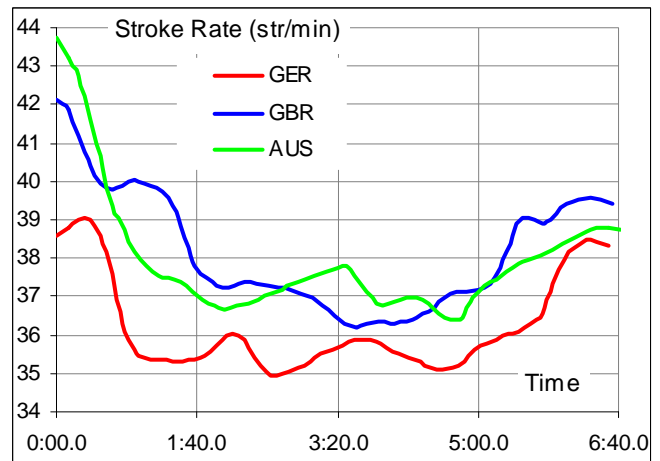
<b>LM2x</b>		Speed over the 500m section (m:s)				
Crew		1	2	3	4	<b>2000</b>
1	POL	1:31.63	1:34.69	1:35.57	1:39.04	<b>6:20.93</b>
2	FRA	1:32.42	1:35.98	1:37.23	1:35.83	<b>6:21.46</b>
3	GRE	1:32.80	1:36.58	1:37.71	1:36.14	<b>6:23.23</b>
		Stroke Rate (str/min)				
1	POL	37.5	35.4	35.6	38.6	<b>36.8</b>
2	FRA	41.8	39.1	39.4	42.1	<b>40.6</b>
3	GRE	40.1	38.5	37.8	41.2	<b>39.4</b>
		Distance per Stroke (m)				
1	POL	8.73	8.95	8.82	7.85	<b>8.57</b>
2	FRA	7.76	8.00	7.84	7.44	<b>7.75</b>
3	GRE	8.06	8.08	8.12	7.57	<b>7.95</b>



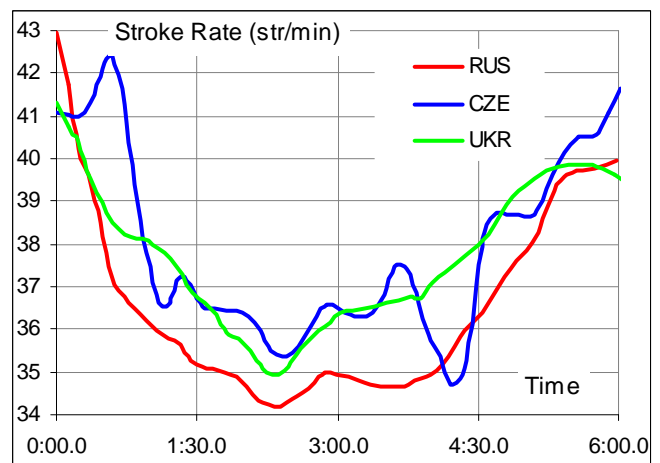
<b>LM4-</b>		Speed over the 500m section (m:s)				
Crew		1	2	3	4	<b>2000</b>
1	DEN	1:26.41	1:31.09	1:33.39	1:30.50	<b>6:01.39</b>
2	AUS	1:28.06	1:31.40	1:32.25	1:31.08	<b>6:02.79</b>
3	ITA	1:27.52	1:31.62	1:32.27	1:32.33	<b>6:03.74</b>
		Stroke Rate (str/min)				
1	DEN	43.2	39.8	38.9	41.0	<b>40.7</b>
2	AUS	41.8	38.0	38.6	40.5	<b>39.7</b>
3	ITA	42.1	39.2	40.3	42.0	<b>40.9</b>
		Distance per Stroke (m)				
1	DEN	8.03	8.28	8.27	8.08	<b>8.15</b>
2	AUS	8.16	8.64	8.43	8.13	<b>8.33</b>
3	ITA	8.13	8.34	8.07	7.74	<b>8.06</b>



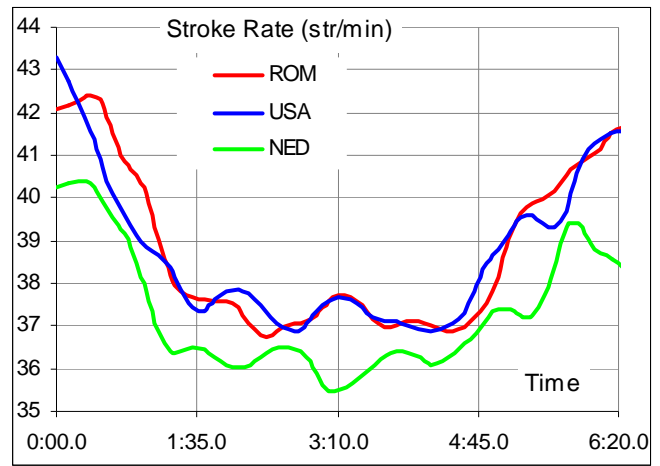
<b>W4x</b>		Speed over the 500m section (m:s)				
Crew		1	2	3	4	<b>2000</b>
1	GER	1:34.63	1:37.58	1:38.58	1:38.50	<b>6:29.29</b>
2	GBR	1:35.81	1:39.13	1:38.84	1:37.48	<b>6:31.26</b>
3	AUS	1:35.16	1:38.97	1:40.73	1:39.87	<b>6:34.73</b>
		Stroke Rate (str/min)				
1	GER	37.0	35.5	35.6	37.1	<b>36.3</b>
2	GBR	40.1	37.2	36.6	38.9	<b>38.2</b>
3	AUS	39.5	37.0	36.9	38.2	<b>37.9</b>
		Distance per Stroke (m)				
1	GER	8.57	8.66	8.56	8.21	<b>8.49</b>
2	GBR	7.81	8.13	8.30	7.91	<b>8.03</b>
3	AUS	7.97	8.19	8.06	7.87	<b>8.02</b>



<b>M4x</b>		Speed over the section (m:s)				
Crew		1	2	3	4	<b>2000</b>
1	RUS	1:25.79	1:31.15	1:30.48	1:29.43	<b>5:56.85</b>
2	CZE	1:25.49	1:31.16	1:31.87	1:28.91	<b>5:57.43</b>
3	UKR	1:28.23	1:31.73	1:32.14	1:26.77	<b>5:58.87</b>
		Stroke Rate (str/min)				
1	RUS	37.8	34.7	35.0	38.6	<b>36.5</b>
2	CZE	39.6	36.1	36.3	39.8	<b>37.9</b>
3	UKR	38.9	35.7	37.1	39.2	<b>37.7</b>
		Distance per Stroke (m)				
1	RUS	9.26	9.50	9.47	8.69	<b>9.21</b>
2	CZE	8.87	9.10	8.99	8.49	<b>8.85</b>
3	UKR	8.75	9.17	8.78	8.82	<b>8.87</b>



<b>W8+</b>		Speed over the 500m section (m:s)				
Crew		1	2	3	4	<b>2000</b>
1	ROM	1:32.49	1:36.67	1:36.26	1:32.28	<b>6:17.70</b>
2	USA	1:32.24	1:36.66	1:37.35	1:33.31	<b>6:19.56</b>
3	NED	1:34.53	1:36.55	1:36.74	1:32.03	<b>6:19.85</b>
		Stroke Rate (str/min)				
1	ROM	40.5	37.2	37.1	40.1	<b>38.7</b>
2	USA	40.0	37.4	37.2	40.1	<b>38.7</b>
3	NED	38.5	36.1	36.3	38.2	<b>37.3</b>
		Distance per Stroke (m)				
1	ROM	8.01	8.33	8.40	8.10	<b>8.20</b>
2	USA	8.14	8.30	8.28	8.01	<b>8.17</b>
3	NED	8.23	8.61	8.54	8.53	<b>8.47</b>



<b>M8+</b>		Speed over the 500m section (m:s)				
Crew		1	2	3	4	<b>2000</b>
1	USA	1:21.95	1:26.23	1:28.77	1:25.53	<b>5:42.48</b>
2	NED	1:23.58	1:28.86	1:26.72	1:24.59	<b>5:43.75</b>
3	AUS	1:22.86	1:28.58	1:28.29	1:25.65	<b>5:45.38</b>
		Stroke Rate (str/min)				
1	USA	41.1	37.4	36.7	38.0	<b>38.3</b>
2	NED	39.4	36.5	36.7	38.0	<b>37.7</b>
3	AUS	42.1	39.4	38.7	41.6	<b>40.4</b>
		Distance per Stroke (m)				
1	USA	8.92	9.31	9.20	9.23	<b>9.15</b>
2	NED	9.11	9.26	9.42	9.33	<b>9.27</b>
3	AUS	8.61	8.61	8.78	8.42	<b>8.59</b>

