Biomechanical Measurements

REPORT

Dates:	31/10/08	Session#	1
		Boat	Empacher

		Athletes	
Place:	City, Country	Steve	(stroke)
Coach:	Peter Jones	John	
Boat:	4x	Peter	
Sex:	Men	Matt	
Weight	Heavyweight		
Group:	J		

Air temperature	*8.0 ^{o} C*
Water temperature	*8.0 ^{o} C*

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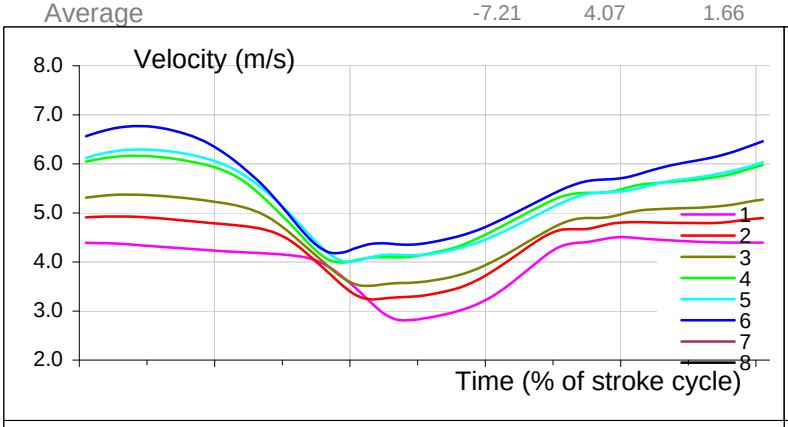
Boat velocity and acceleretion

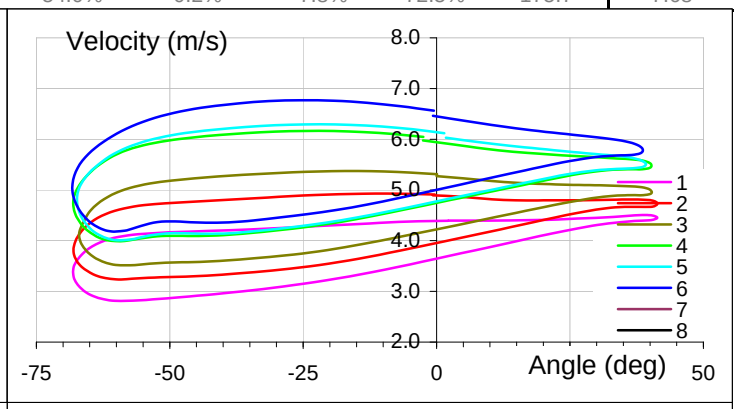
31/10/08

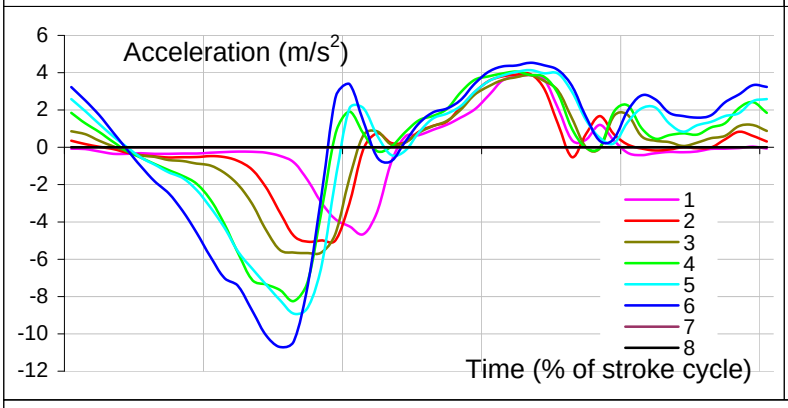
This page shows mechanics of whole boat at various stroke rates

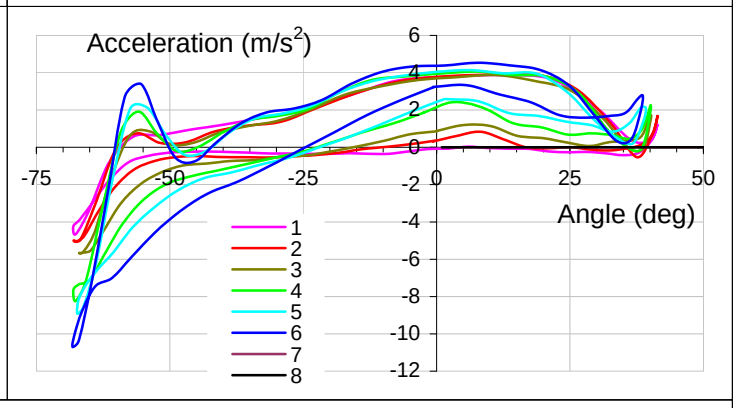
	Names	Stroke Rate (str/min)	Average Boat Speed (m/s)	Minimal Boat Speed (m/s)	Maximal Boat Speed (m/s)	Variation (%)	Boat Efficiency (%)	Distance per Stroke (m)	Time 2000m (min.sec)	Time at water temp.=25deg (min.sec)
1	Steve, John, Peter, Matt	20.4	3.99	2.82	4.50	13.9%	98.27%	11.73	8:21.19	8:14.85
2	Steve, John, Peter, Matt	24.3	4.38	3.24	4.93	13.7%	98.29%	10.79	7:36.60	7:30.82
3	Steve, John, Peter, Matt	28.1	4.66	3.51	5.37	14.1%	98.18%	9.95	7:08.93	7:03.51
4	Steve, John, Peter, Matt	32.8	5.22	3.99	6.16	14.2%	98.12%	9.57	6:22.83	6:17.99
5	Steve, John, Peter, Matt	35.1	5.26	4.02	6.29	14.8%	97.98%	9.00	6:20.17	6:15.36
6	Steve, John, Peter, Matt	38.3	5.53	4.19	6.77	15.6%	97.73%	8.67	6:01.43	5:56.86
7	-	-	-	-	-	-	-	-	-	-
8	-	-	-	-	-	-	-	-	-	-
	Average	29.8	4.84	3.63	5.67	14.4%	98.1%	9.95	6:58.53	6:53.23

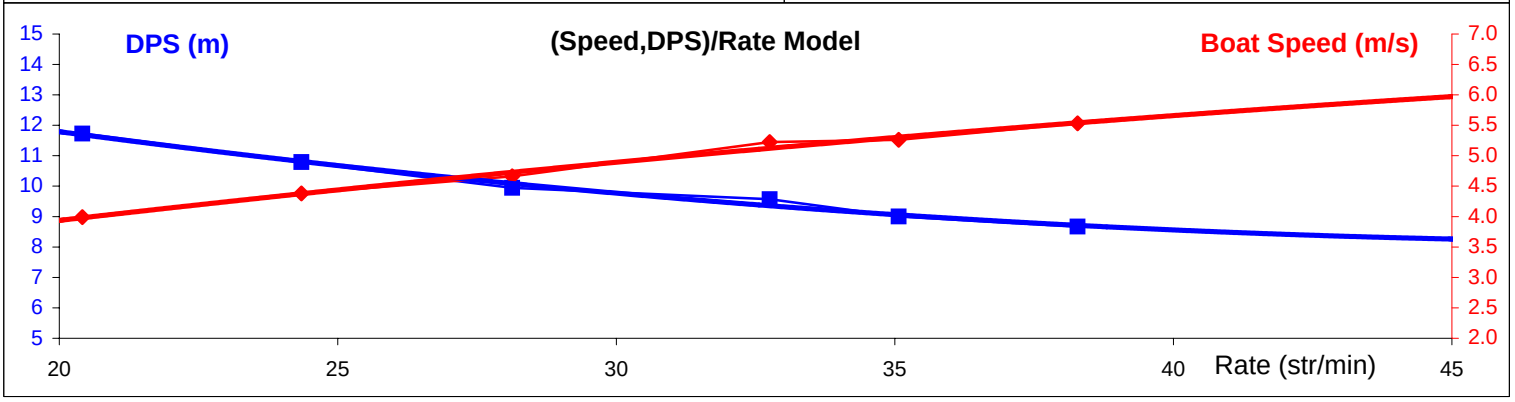
	Comments	Acceleration Minimum (m/s2):	Acceleration Maximum (m/s2):	First peak (m/s2)	Zero before catch (%)	Minimal from catch (%)	Zero after catch (%)	Drive Maximal at (%)	Propulsive Power (W)	Drag Factor
1	Sample 01	-4.66	3.87	0.00	97.8%	0.4%	8.5%	73%	150.6	8.99
2	Sample 02	-5.06	3.92	0.51	52.8%	0.3%	7.6%	79%	174.4	7.88
3	Sample 03	-5.67	3.87	0.70	47.9%	0.0%	8.0%	73%	207.4	7.74
4	Sample 04	-8.24	4.06	2.13	42.2%	0.4%	7.6%	70%	255.6	6.77
5	Sample 05	-8.92	4.14	2.51	42.6%	0.0%	7.6%	69%	278.2	7.19
6	Sample 06	-10.70	4.53	4.13	40.8%	0.0%	7.6%	71%	339.6	7.48
7	0	-	-	-	-	-	-	-	0.0	-
8	0	-	-	-	-	-	-	-	0.0	-
	Average	-7.21	4.07	1.66	54.0%	0.2%	7.8%	72.5%	175.7	7.68







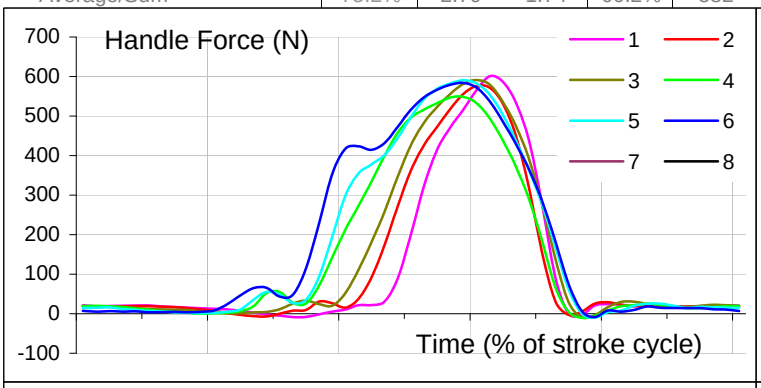


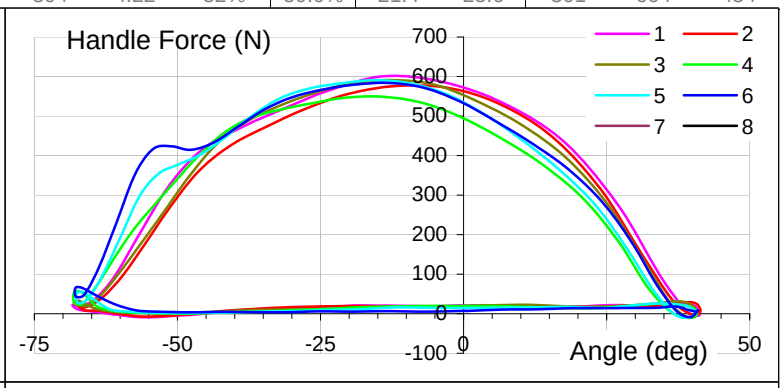


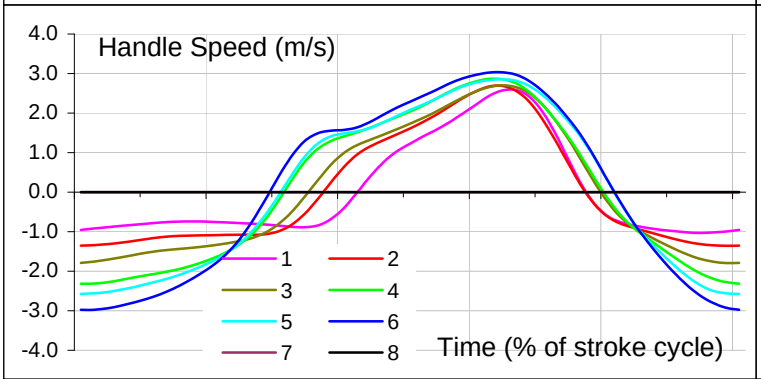
This page shows Biomechanics of one rower at various stroke rates

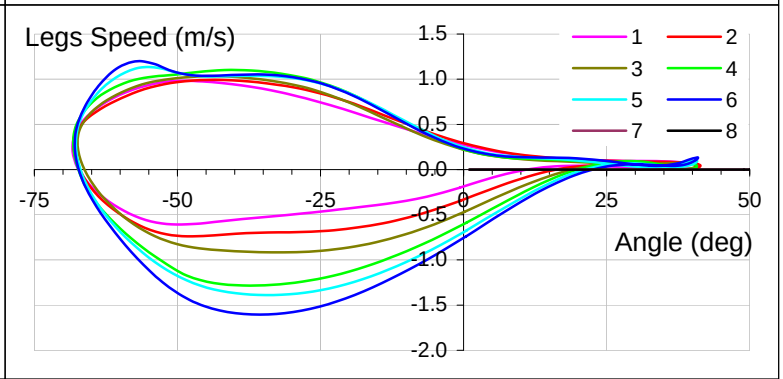
#	Name	Stroke Rate (str/min)	Drive Time (s)	Rhythm (%)	Catch (dg)	Release (dg)	Angle (dg)	Length (m)	Length /Height (%)	Vertical Catch Slip	Drive Start Angle (deg)	Vertical Release Slip	Drive End Angle (deg)	Effective Angle (deg)	Effective Angle (%)
1	Steve	20.4	1.02	34.8%	-68.3	41.2	109.6	1.61	87.8%	6.9	-61.5	2.5	38.7	100.2	91.5%
2	Steve	24.3	0.98	39.9%	-68.1	41.4	109.4	1.60	87.7%	10.8	-57.2	3.4	38.0	95.2	87.0%
3	Steve	28.1	0.95	44.5%	-67.3	40.6	108.0	1.58	86.5%	14.4	-53.0	3.7	36.9	89.9	83.2%
4	Steve	32.8	0.89	48.6%	-68.0	40.6	108.7	1.59	87.1%	16.4	-51.6	5.6	35.1	86.7	79.7%
5	Steve	35.1	0.87	50.7%	-67.7	40.8	108.5	1.59	86.9%	15.1	-52.6	7.0	33.8	86.4	79.7%
6	Steve	38.3	0.82	52.4%	-67.8	40.9	108.7	1.59	87.1%	11.3	-56.5	7.9	33.0	89.5	82.3%
7	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
8	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Average/Sum		0.92	45.1%	-67.9	40.9	108.8	1.60	87.2%	12.5	-55.4	5.0	35.9	91.3	83.9%

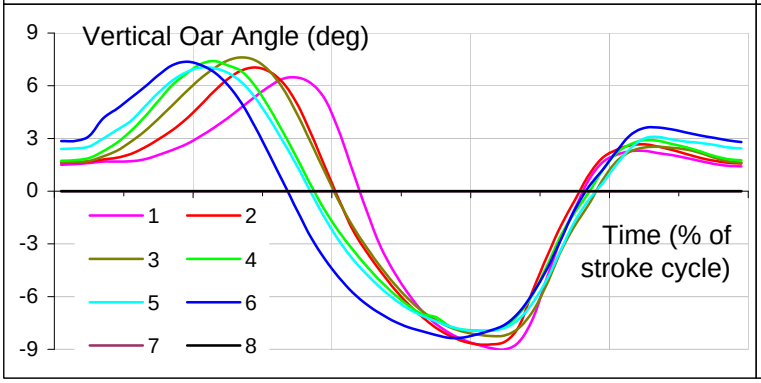
#	Sample	Blade Efficiency (%)	Max.Handle Velocity (m/s)	Average Velocity (m/s)	Max.Velocity at (%)	Force Max.(N)	Force Aver.(N)	Aver.F/Weight (N/kg)	Aver / Max (%)	Max.Force at (%)	Froece up to 70% Max (deg)	Force down from 70% Max (deg)	Rowing Power (W)	Work per Stroke (J)	Propulsive Work (J)
1	Sample 01	68.6%	2.59	1.57	68.6%	601	304	4.22	51%	49.7%	23.3	22.9	210	618	424
2	Sample 02	72.0%	2.69	1.63	67.8%	576	279	3.88	48%	51.4%	25.4	23.1	238	586	422
3	Sample 03	75.4%	2.70	1.67	64.8%	591	299	4.15	50%	50.6%	23.3	24.6	281	600	453
4	Sample 04	79.4%	2.87	1.79	62.7%	548	290	4.02	53%	49.9%	20.7	27.6	311	569	452
5	Sample 05	78.2%	2.86	1.83	65.9%	591	318	4.42	54%	48.1%	22.8	28.3	357	611	478
6	Sample 06	77.7%	3.03	1.94	67.6%	584	334	4.64	57%	50.2%	13.2	26.8	406	636	494
7	0	-	-	-	-	-	-	-	-	-	-	-	-	-	-
8	0	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Average/Sum	75.2%	2.79	1.74	66.2%	582	304	4.22	52%	50.0%	21.4	25.6	301	604	454

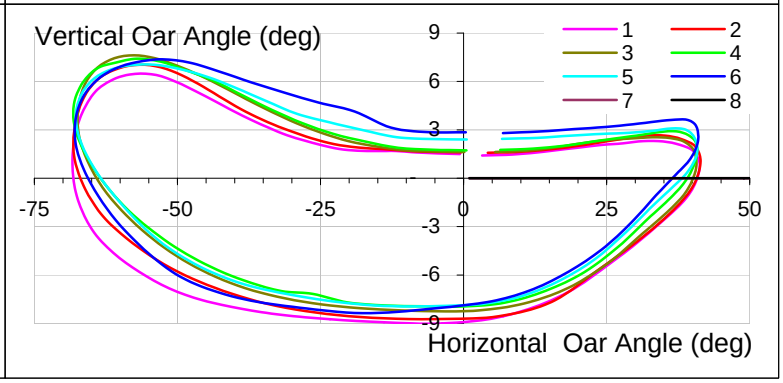








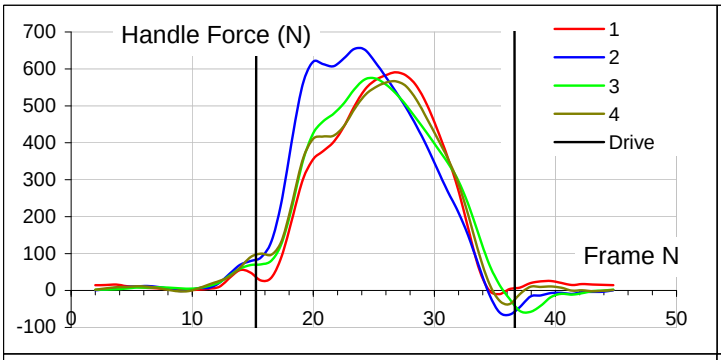


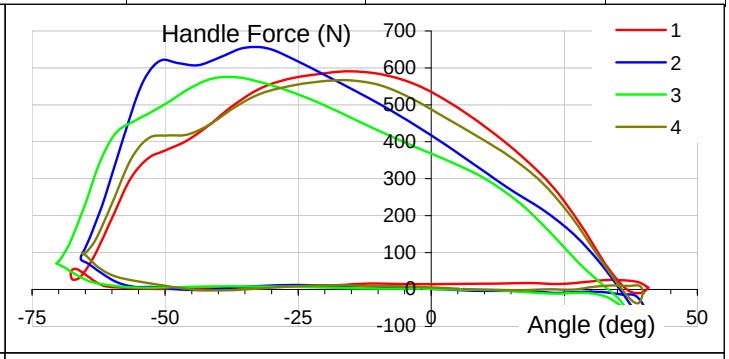


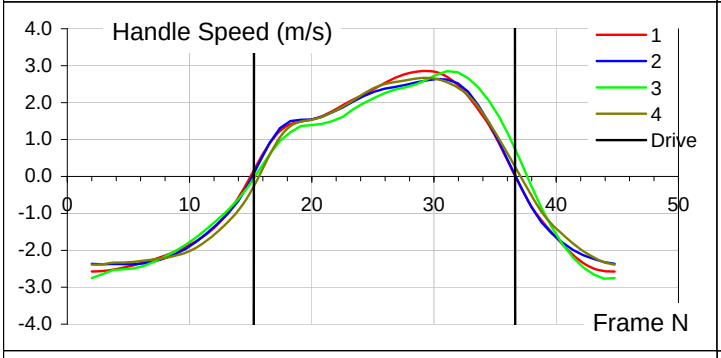
This page shows synchronization of the crew at certain stroke rate. The charts in the left column can be synchronized with video

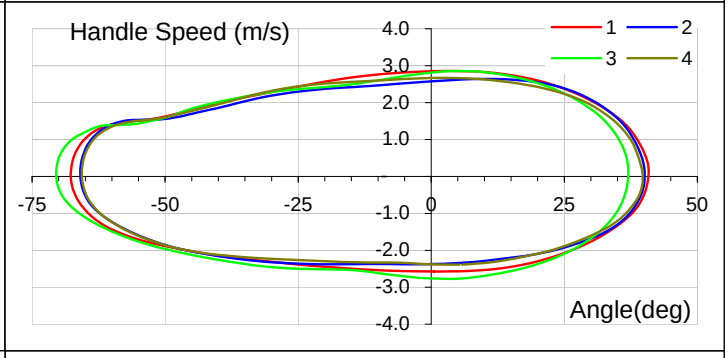
#	Name	Drive Time (s)	Rhythm (%)	Catch (dg)	Release (dg)	Angle (dg)	Length (m)	Length /Height (%)	Vertical Catch Slip	Vertical Release Slip	Effective Angle (%)
1	Steve	0.87	50.7%	-67.7	40.8	108.5	1.59	86.9%	15.1	7.0	79.7%
2	John	0.86	50.4%	-65.8	39.9	105.7	1.55	81.6%	12.2	16.7	72.7%
3	Peter	0.89	52.1%	-70.5	36.8	107.3	1.57	82.4%	9.7	13.2	78.7%
4	Matt	0.86	50.0%	-65.6	39.7	105.4	1.55	84.9%	16.4	29.9	56.0%
	Average/Sum	0.87	50.8%	-67.4	39.3	106.7	1.56	83.9%	13.3	16.7	71.8%

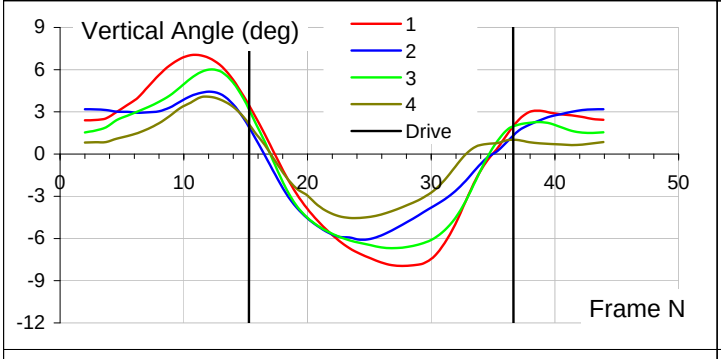
#	Rowing Power (W)	Force Max.(N)	Force Aver.(N)	Aver.F/Weight (N/kg)	Aver / Max (%)	Max.Force at (%)	Froece up to 70% Max (deg)	Force down from 70% Max (deg)	Legs Travel (m)	Legs Max. Speed (m/s)	Blade Efficiency (%)
1	357	591	318	4.42	53.8%	48.1%	22.8	28.3	0.53	1.13	78.2%
2	370	654	367	3.99	56.1%	28.9%	9.1	44.4	0.57	1.13	81.6%
3	335	574	320	3.64	55.8%	31.8%	10.4	42.4	0.56	1.11	80.8%
4	347	566	314	4.36	55.5%	47.6%	11.8	29.1	0.54	1.17	81.2%
	352	596	330	4.10	55%	39.1%	13.5	36.0	0.55	1.14	80.4%

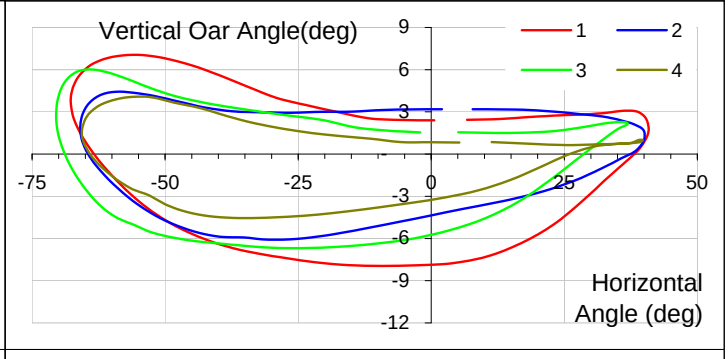


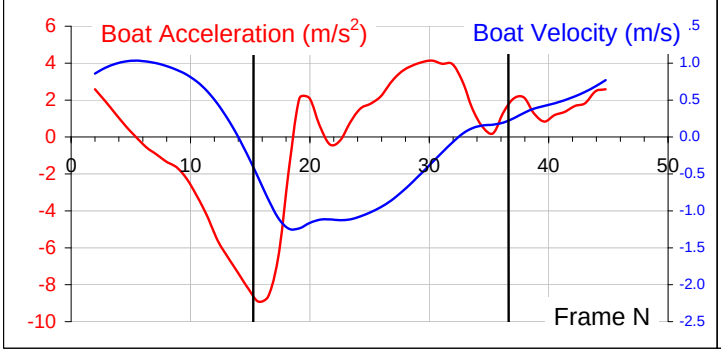


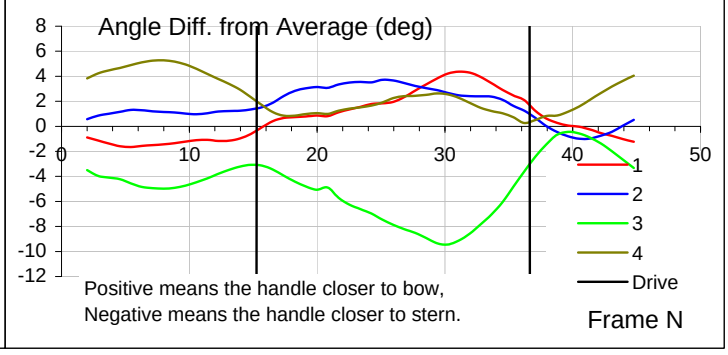








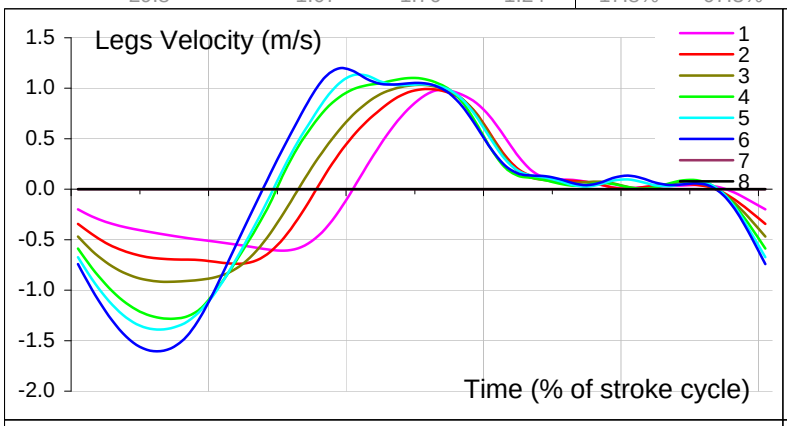


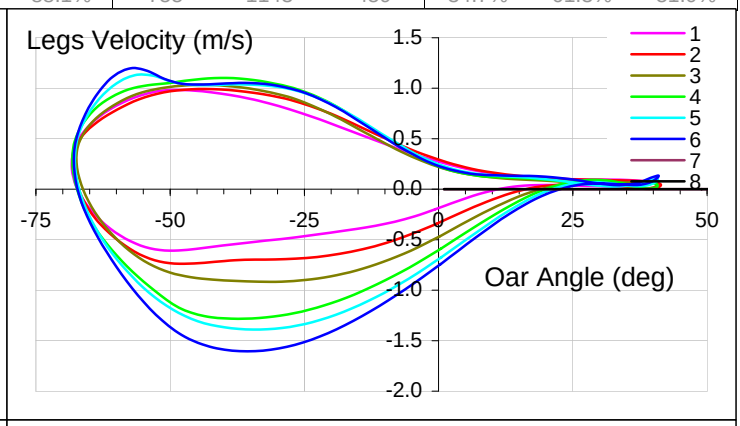


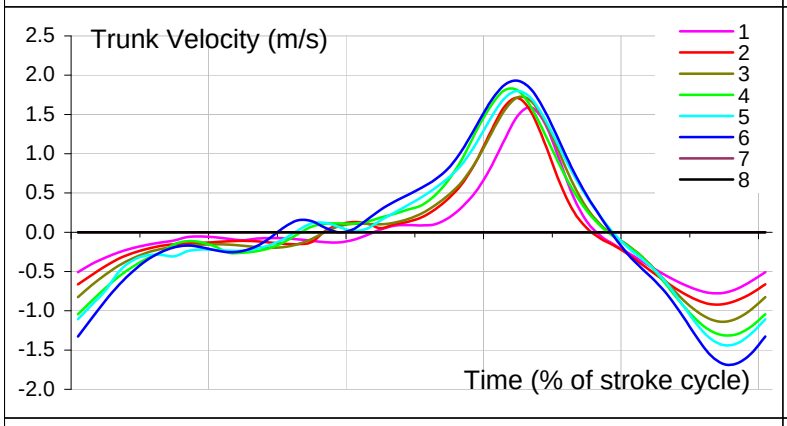
This page shows variables of body segments work of one rower at various stroke rates

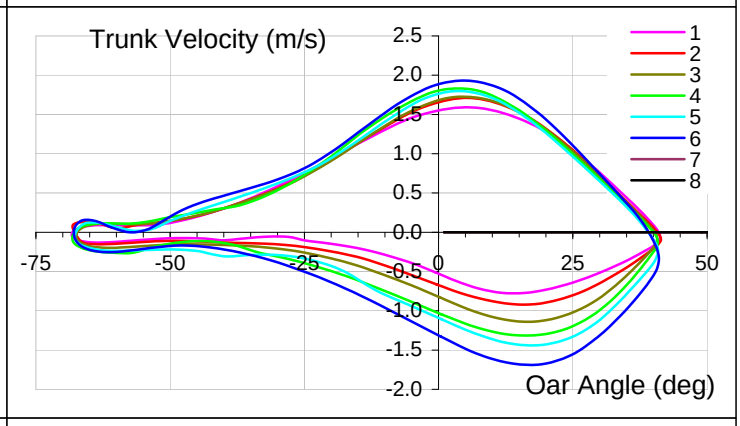
Name	Displacement						Power					
	Legs (m)	Trunk (m)	Arms (m)	Legs Share	Trunk Share	Arms Share	Legs (W)	Trunk (W)	Arms (W)	Legs Share	Trunk Share	Arms Share
1 Steve	0.55	0.56	0.52	34.1%	34.8%	32.3%	86	105	66	33.4%	40.9%	25.7%
2 Steve	0.54	0.57	0.52	33.5%	35.3%	32.4%	97	121	74	33.3%	41.4%	25.3%
3 Steve	0.53	0.56	0.52	33.4%	35.2%	32.6%	116	141	89	33.6%	40.7%	25.7%
4 Steve	0.53	0.55	0.53	33.4%	34.2%	33.5%	142	147	96	36.8%	38.2%	25.0%
5 Steve	0.53	0.53	0.55	33.3%	33.6%	34.5%	162	167	113	36.6%	37.8%	25.6%
6 Steve	0.52	0.56	0.54	32.4%	35.2%	33.8%	180	192	128	36.0%	38.4%	25.7%
7 -	-	-	-	-	-	-	-	-	-	-	-	-
8 -	-	-	-	-	-	-	-	-	-	-	-	-
Average	0.53	0.55	0.53	33.4%	34.7%	33.2%	130	145	94	34.9%	39.5%	25.5%

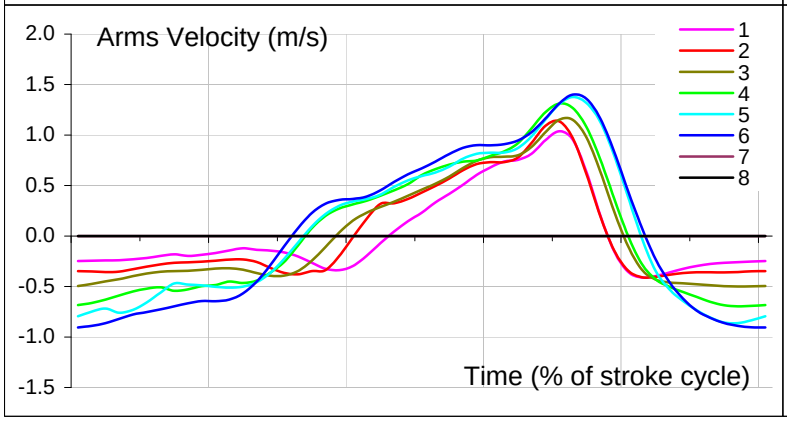
Rate		Maximal Speed (m/s)			Max.Speed at Angle (%)			Max. Power (W)			Max.Power at Angle (%)		
		Legs (m/s)	Truck (m/s)	Arms (m/s)	Legs (%)	Trunk (%)	Arms (%)	Legs (W)	Trunk (W)	Arms (W)	Legs (%)	Trunk (%)	Arms (%)
1	20.4	0.98	1.59	1.04	20.7%	68.6%	87.0%	648	1079	444	33.4%	58.9%	49.7%
2	24.3	0.99	1.71	1.14	20.1%	67.8%	90.6%	675	1126	421	36.9%	59.6%	51.4%
3	28.1	1.03	1.72	1.15	22.3%	64.8%	85.8%	750	1139	461	32.2%	64.8%	50.6%
4	32.8	1.10	1.80	1.31	24.1%	69.3%	87.5%	807	1102	422	33.3%	62.7%	56.2%
5	35.1	1.13	1.80	1.38	10.2%	65.9%	88.6%	826	1165	481	37.4%	59.9%	48.1%
6	38.3	1.20	1.93	1.40	9.6%	67.6%	89.3%	826	1245	525	34.8%	61.7%	50.2%
7	-	-	-	-	-	-	-	-	-	-	-	-	-
8	-	-	-	-	-	-	-	-	-	-	-	-	-
	29.8	1.07	1.76	1.24	17.8%	67.3%	88.1%	755	1143	459	34.7%	61.3%	51.0%

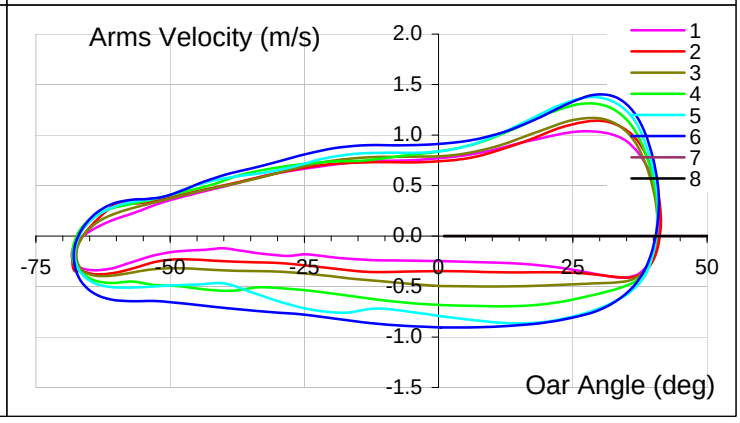






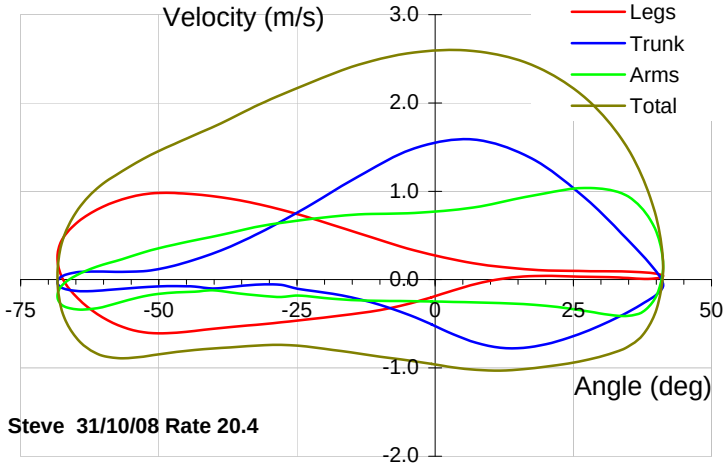


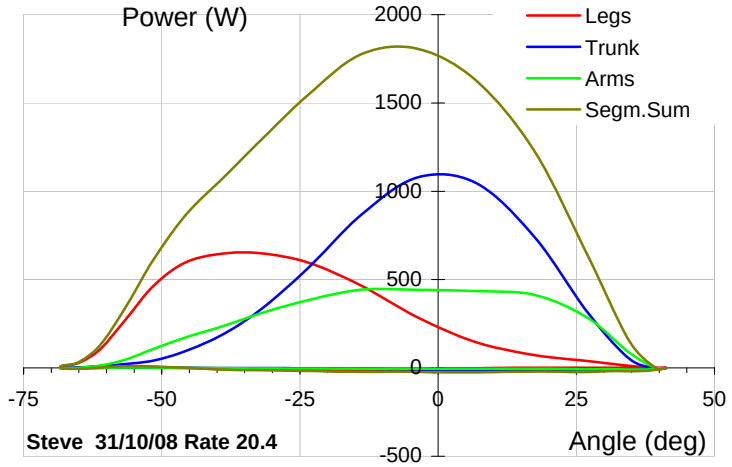


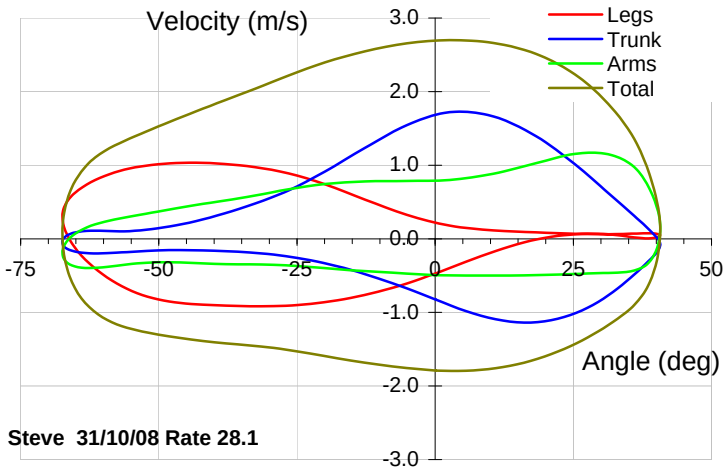


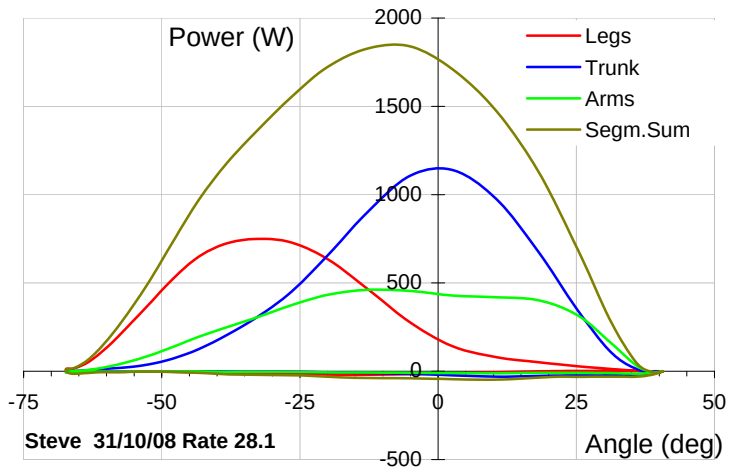
Segments Work Overlap

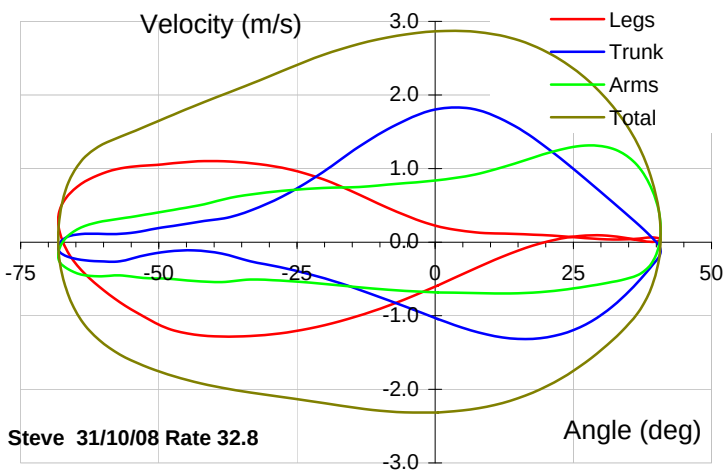
This page shows overlaped variables of body segments work of one rower at various stroke rates

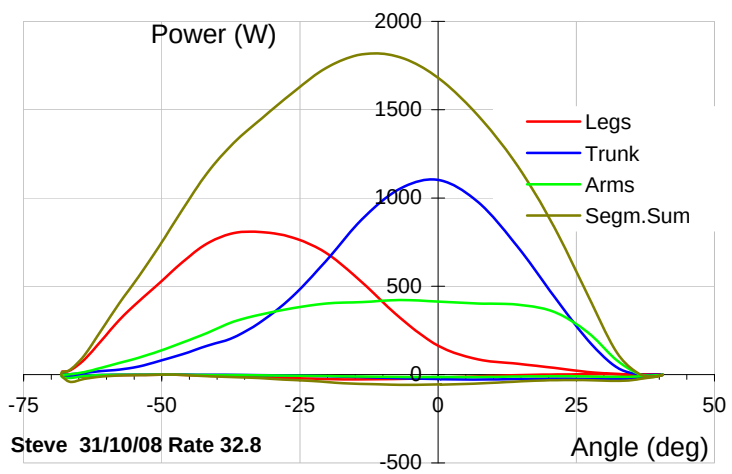


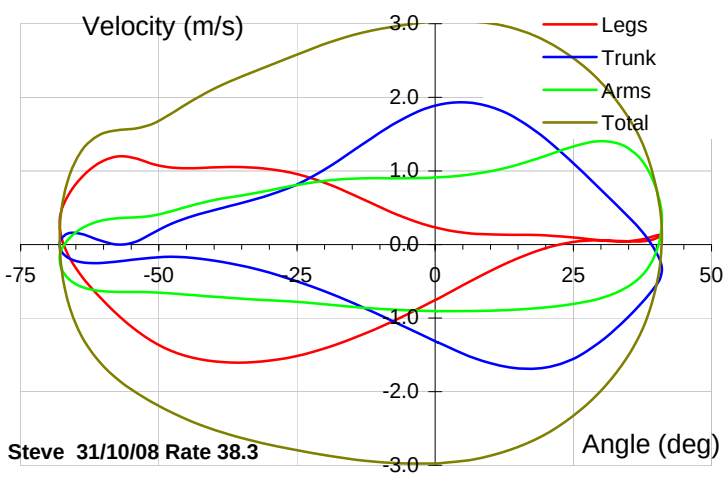


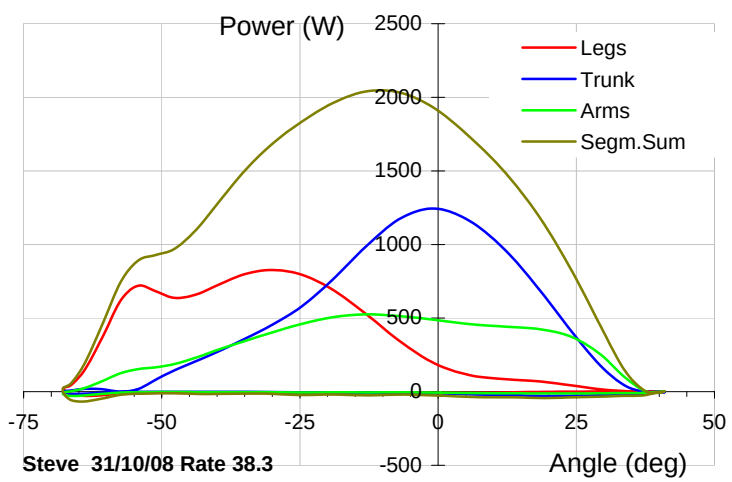








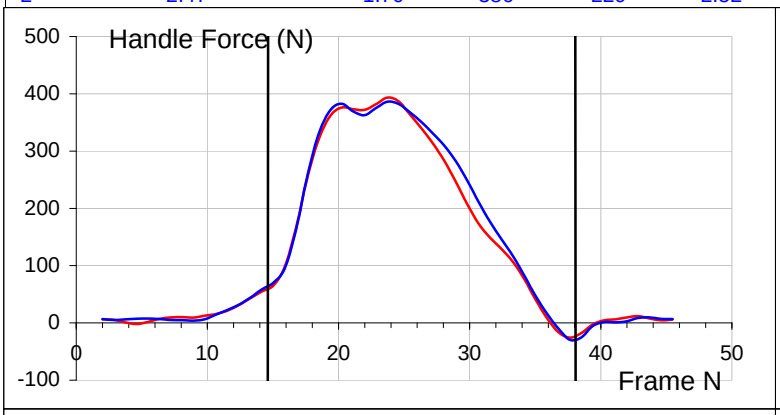


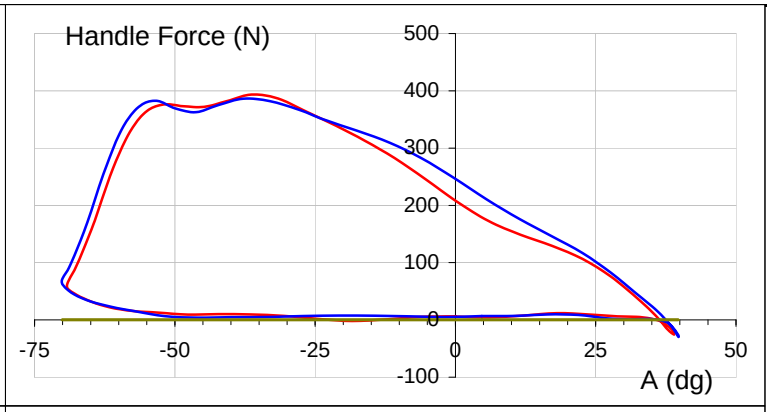


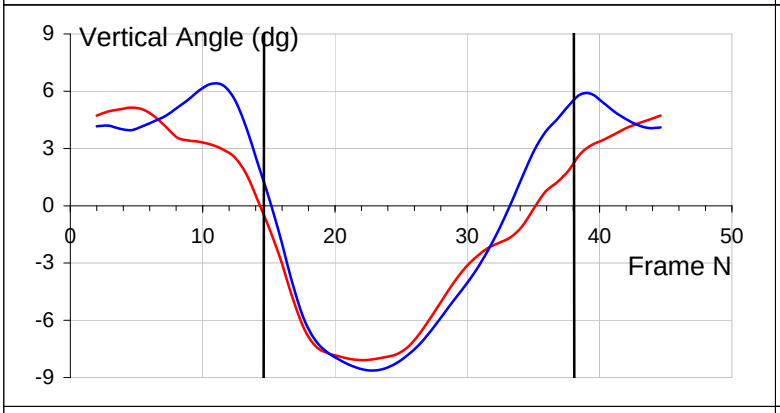
This page shows left/right or stroke/bow oars of a single sculler or pair. The charts in the left column can be synchronized with video

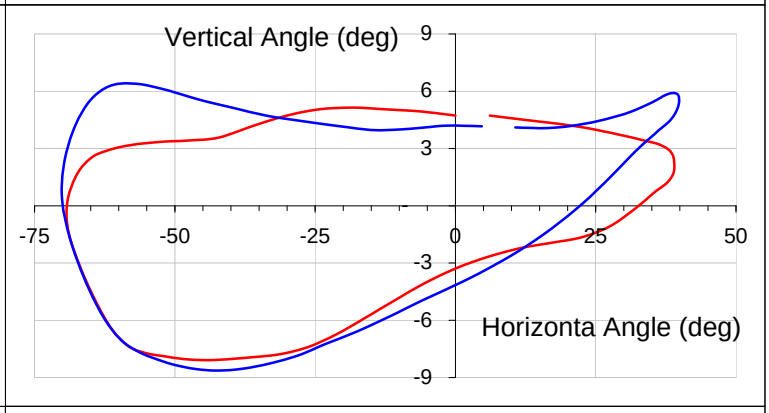
Name	Drive Time (s)	Rhythm (%)	Catch (dg)	Release (dg)	Angle (dg)	Length (m)	Length /Height (%)	Vertical Catch Slip	Vertical Release Slip	Effective Angle (%)	Blade Efficiency (%)
1 John Smith Right	0.936	54%	-69.1	39.0	108.1	1.57	82.4%	4.9	30.5	67.2%	78.3%
2 John Smith Left	0.936	54%	-70.1	39.7	109.8	1.59	83.7%	6.1	26.4	70.5%	76.9%

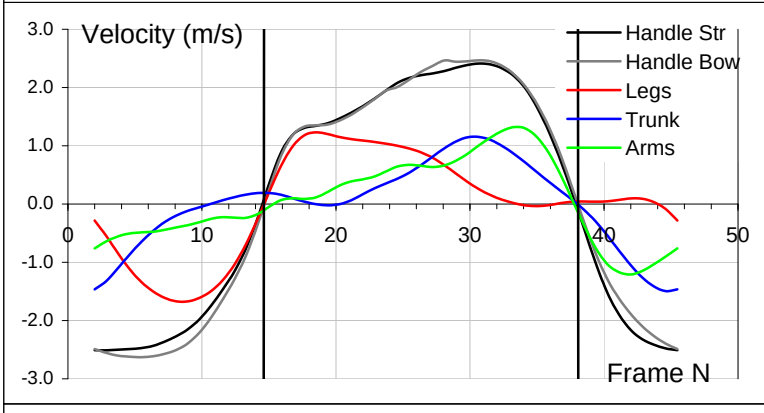
	Max.Handle Velocity (m/s)	Average Velocity (m/s)	Force Max.(N)	Force Aver.(N)	Aver.F/Weight (N/kg)	Aver / Max (%)	Max.Force at (%)	Froece up to 70% Max (deg)	Force down from 70% Max	Rowing Power (W)	Work Per Stroke (J)	Propulsive Work (J)
1	2.41	1.67	394	220	2.42	56%	30%	8.6	48.7	217	378	296
2	2.47	1.70	386	229	2.52	59%	29%	8.0	43.8	230	400	308

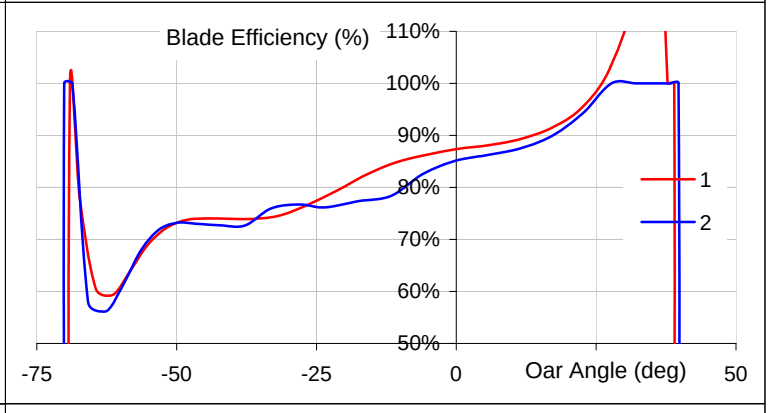


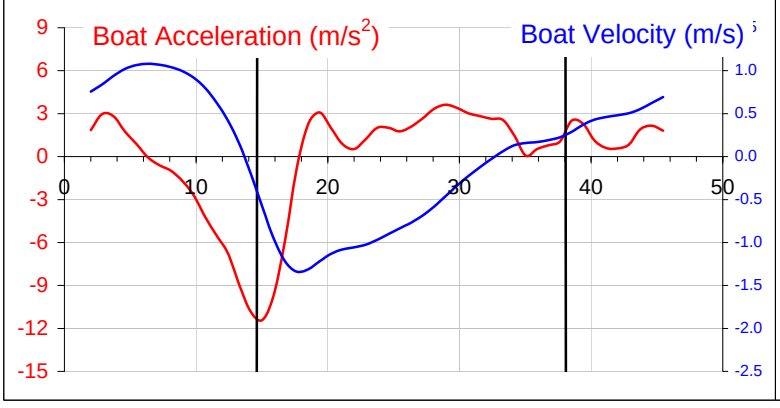


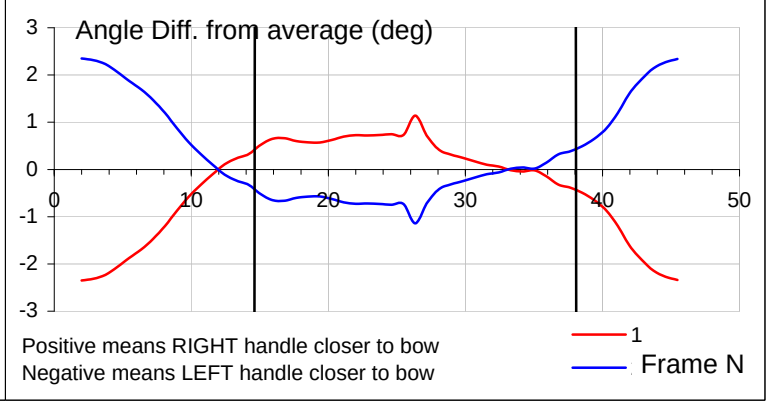












Example of still pictures produces from a video file.
They can be synchronized with Biomechanical variables based on the frame number below each picture