

## BioRow™ Oar Angle Guides

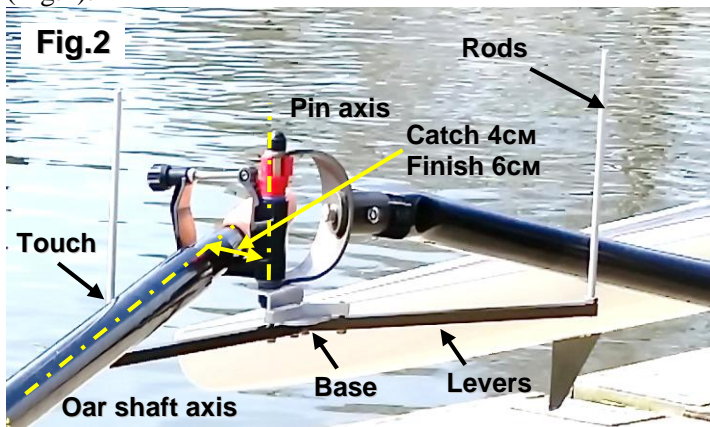
The speed and results in rowing depend on the rower's power, which is product of three components only: stroke rate, length and force. Everyone knows that rowing is faster at a higher rate with a longer stroke, whilst applying more force. Development of rowing electronics allowed us easy and reliable feedback on the stroke rate. Now it is a good time to take under control the stroke length, which is defined by the furthest handle positions and directly correspond to oar angles at the catch and finish. Many successful rowers use a very simple method to control the stroke length: oar angle guides, which was mentioned in RBN 2001/11, where tables were given for easy setup. Some crews even raced with the angle guides: the most notable example being the gold medallist South African LM4- at the 2012 Olympics in London.



Previously, every crew had to invent their own way to make the guides and various materials were used, such as cocktail straws, metal wires, wooden sticks, etc. These were not very handy and reliable.

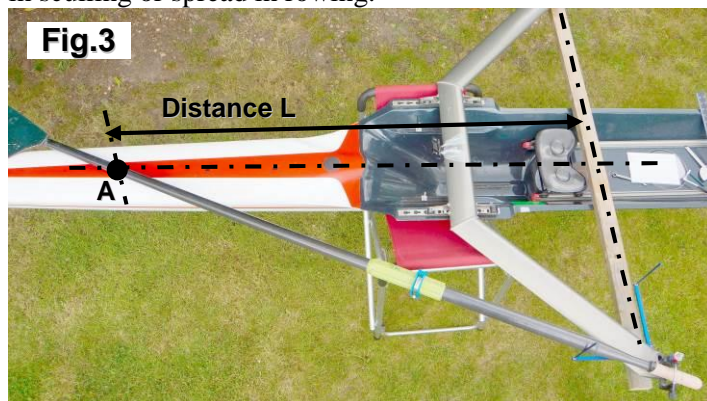
New **BioRow™ Angle Guides** allow easy, reliable and accurate MEASUREMENT and CONTROL of the catch and finish oar angles. Using them, we have found another very important benefit: they help to achieve better SYNCHRONISATION in a crew. Rowers can hear the clicks when the oar shaft touches the metal guides, and they can synchronise their movements according to these sounds.

**BioRow™ Angle Guides** consist of the base connected to rotating horizontal levers with vertical rods at the ends. The base is mounted under the bottom nut of the pin (Fig.2).



To MEASURE the angles, the bolts under the levers should be semi-tightened, to let them rotate with a small force. When rowing on water, the oar shaft pushes the levers to the position of the longest angles at catch and finish, then, the angles could be measured off water. To do this, the

oar should be placed in the oarlock with its handle end (Fig.2), to keep 4cm distance between the centres of the pin and the oar shaft for the catch angles, and 6cm – for the finish angles (because, when rowing, oar sleeve pushes the bow face of the oarlock at catch, but the stern face at finish, so its distance from the pin is longer). Put the oar shaft into contact with the vertical rod and measure the distance L from line of pins to the point A, where the shaft crosses the centre line of the boat (Fig.3). The angle could be found using Tables 2 and 3 below using this distance L and span in sculling or spread in rowing.



To CONTROL the angles, the sequence is reversed. Firstly, define your target catch and finish angles and find out the distances L from the Tables 2 and 3 below. Then, mark point A on the boat centreline at the distance L from the line of the pins and put an oar across the oarlock and point A. Release the two bolts at the bottom of lever and rotate it until the vertical rod touches the oar shaft from outside. Tighten the two bottom bolts and check that the vertical rod is still in contact the oar shaft. If you keep the marks on the boat, you could reinstall the Guides next time in a couple of minutes.

When rowing, firstly make sure you touch the Guides at catch and finish at a low rate. Then, increase the stroke rate, but try to maintain the contact with the Guides. Table 1 gives target angles for Olympic level rowers, which could be decreased by 3-5deg for club rowers and masters.

Table 1 Target angles (deg)	Catch	Finish	Total
Men Sculling	70	44	114
Lightweight men sculling	66	44	110
Men Sweep	59	33	92
Lightweight men sweep	58	32	90
Women Sculling	66	44	110
Lightweight women sculling	63	43	106
Women Sweep	58	32	90

**BioRow™ Angle Guides** could be quickly installed on any boat without modification and removed in seconds, if not needed. The angle setting procedure is accurate and requires only tape measure. The device is lightweight (less than 160g) and could be quickly packed in a compact bag provided. This is a mandatory device in a toolbox of any coach and rower can be ordered from us only for £60 each, or for £100 a pair.

Enjoy using your **BioRow™ Angle Guides** and row faster!

**Table 2. Distance L (cm) depending on your target CATCH angle and pin position from the centreline of the boat (spread in sweep rowing, or half-span in sculling). Distance between the oar axis and pin is 4cm.**

Catch Angle (deg)	Span in sculling (cm)				Spread in rowing (cm)										
	156	157	158	159	160	161	162	83.0	83.5	84.0	84.5	85.0	85.5	86.0	86.5
-54								121.0	121.7	122.4	123.1	123.8	124.5	125.2	125.9
-55								125.5	126.2	126.9	127.7	128.4	129.1	129.8	130.5
-56								130.2	130.9	131.7	132.4	133.2	133.9	134.7	135.4
-57								135.2	135.9	136.7	137.5	138.2	139.0	139.8	140.5
-58								140.4	141.2	142.0	142.8	143.6	144.4	145.2	146.0
-59								145.9	146.7	147.6	148.4	149.2	150.1	150.9	151.7
-60	143.1	144.0	144.8	145.7	146.6	147.4	148.3	151.8	152.6	153.5	154.4	155.2	156.1	157.0	157.8
-61	149.0	149.9	150.8	151.7	152.6	153.5	154.4	158.0	158.9	159.8	160.7	161.6	162.5	163.4	164.3
-62	155.2	156.2	157.1	158.0	159.0	159.9	160.9	164.6	165.6	166.5	167.4	168.4	169.3	170.3	171.2
-63	161.9	162.9	163.9	164.8	165.8	166.8	167.8	171.7	172.7	173.7	174.7	175.6	176.6	177.6	178.6
-64	169.0	170.1	171.1	172.1	173.1	174.2	175.2								
-65	176.7	177.8	178.9	180.0	181.0	182.1	183.2								
-66	185.0	186.1	187.3	188.4	189.5	190.6	191.8								
-67	194.0	195.2	196.3	197.5	198.7	199.9	201.1								
-68	203.7	205.0	206.2	207.4	208.7	209.9	211.2								
-69	214.4	215.7	217.0	218.3	219.6	220.9	222.2								
-70	226.0	227.4	228.7	230.1	231.5	232.9	234.2								

**Table 3. Distance L depending on your target FINICH angle and pin position from the centreline of the boat (spread in sweep rowing, or half-span in sculling). Distance between the oar axis and pin is 6cm.**

Finish Angle (deg)	Span in sculling (cm)				Spread in rowing *cm)										
	156	157	158	159	160	161	162	83.0	83.5	84.0	84.5	85.0	85.5	86.0	86.5
30								41.0	41.3	41.6	41.9	42.1	42.4	42.7	43.0
31								42.9	43.2	43.5	43.8	44.1	44.4	44.7	45.0
32								44.8	45.1	45.4	45.7	46.0	46.4	46.7	47.0
33								46.7	47.1	47.4	47.7	48.0	48.4	48.7	49.0
34								48.7	49.1	49.4	49.8	50.1	50.4	50.8	51.1
35								50.8	51.1	51.5	51.8	52.2	52.5	52.9	53.2
36	49.3	49.6	50.0	50.3	50.7	51.1	51.4	52.9	53.2	53.6	54.0	54.3	54.7	55.1	55.4
37	51.3	51.6	52.0	52.4	52.8	53.1	53.5	55.0	55.4	55.8	56.2	56.5	56.9	57.3	57.7
38	53.3	53.7	54.1	54.5	54.9	55.3	55.7	57.2	57.6	58.0	58.4	58.8	59.2	59.6	60.0
39	55.4	55.8	56.3	56.7	57.1	57.5	57.9	59.5	59.9	60.3	60.7	61.1	61.5	61.9	62.3
40	57.6	58.0	58.5	58.9	59.3	59.7	60.1								
41	59.9	60.3	60.7	61.2	61.6	62.0	62.5								
42	62.2	62.6	63.1	63.5	64.0	64.4	64.9								
43	64.5	65.0	65.5	65.9	66.4	66.9	67.3								
44	67.0	67.5	67.9	68.4	68.9	69.4	69.9								
45	69.5	70.0	70.5	71.0	71.5	72.0	72.5								
46	72.1	72.7	73.2	73.7	74.2	74.7	75.2								