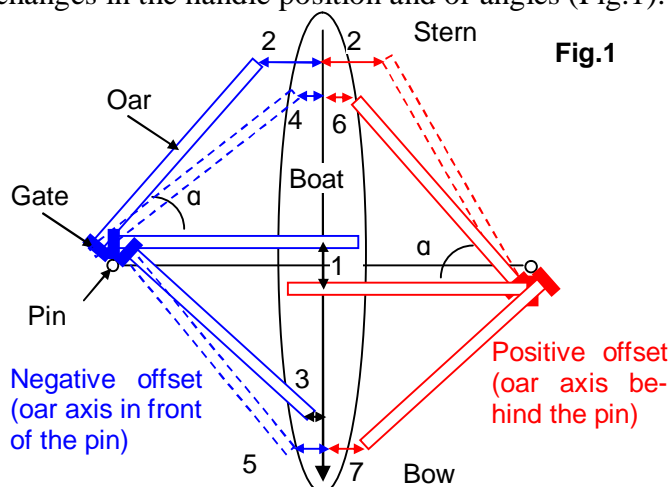


**Q&A**

**Q:** Michael Shannon, USOC Sports Physiologist from Chula Vista, California is asking: “In recreational rowing boats, it is common to swivel the gate at the centre of the pin. Would there be any advantage to locating the oarlock above the centre of the pin?”

**A:** We would generalise the question in this following way: “How does offsetting the oarlock (and, hence, the axis of the oar) from the centre of rotation at the pin affects rowing mechanics?”

It is possible to design swivels with different offsets, in front of the pin (closer to the stern, negative offset), or behind the pin (closer to the bow, positive offset), or zero offset. This would lead to the following changes in the handle position and or angles (Fig.1):



1. In saggital plane (longitudinal axis of the boat), offsetting the oar axis is similar to moving the pin relative to the boat in the same direction (Fig.1, 1), so the stretcher needs to be moved to preserve the oar angles.
2. In frontal plane (sideward), negative offset moves the handle position outwards at catch (2, works similar to wider span/spread) and inwards at finish (3). If the distances between handles at catch and finish are preserved, then the angle at catch must be shorter (4) and the finish angle, longer (5). If catch angles (55-70deg) are usually larger than finish angles (30-45 deg), offsetting oars in front of the pin would make them more even.
3. Positive offset moves the handle position inwards at catch (6, works similar to narrower span/spread) and outwards at finish (7). If the rower preserves distances between handles at catch and finish, this would lead to a longer angle at catch and a shorter angle at finish, i.e., would increase this difference.

In the current swivel design, the axis of the oar has a negative offset about -4 cm. Michael’s question is about an oarlock with 0 cm offset from the pin, i.e. the oar axis should be moved +4 cm relative to the current design. In sculling, if the oar angles are preserved, this

would make the handles position 4 cm wider at catch (60 deg) and about 3 cm narrower at finish (45 deg). In sweep rowing, it moves the handle 2 cm outwards at catch and 1cm inwards at finish. If the handles positions are preserved, zero offset would make oar angle about 3deg longer at catch and similarly shorter at finish, i.e. it would make the catch and finish angles more uneven, which is unlikely to be beneficial.

Also, in a zero offset gate the axis of rotation would go through the oar shaft, which doesn’t allow for using a solid pin and require a more complicated design. Alternatively, developing swivels with bigger negative offsets requires special efforts for preventing oar backlash in the swivel when axial force is applied. Therefore, **the current gate design looks quite balanced and optimised.**

**Q:** A 16yo sculler from India Karn Rao is asking about Drag Factor (DF) on the Dynamic ergometer:

- a) From informal communications with US rowing coaches I’ve found that they tend to use DF of 110.
- b) The Concept2 UK website suggests DF 130-140 for Junior rowers ([http://concept2.co.uk/training/guide/damper\\_lever](http://concept2.co.uk/training/guide/damper_lever)).
- c) Australian Rowing website based on a research report suggests DF 105 for Lightweight men. ([http://www.concept2.com.au/app\\_cmslib/media/lib/1003/m4019\\_8\\_v1\\_the%20erg%20-%20ivan%20hooper%20study.pdf](http://www.concept2.com.au/app_cmslib/media/lib/1003/m4019_8_v1_the%20erg%20-%20ivan%20hooper%20study.pdf))
- d) Crossfit.com site suggests that, based on my current weight 70kg, I should use DF of 120. (<http://board.crossfit.com/showthread.php?t=5310>).
- e) BioRow site suggests DF of 133 for sculling on the DIR ([http://www.biorow.com/RBN\\_en\\_2011\\_files/2011RowBiomNews01.pdf](http://www.biorow.com/RBN_en_2011_files/2011RowBiomNews01.pdf))

What would be the most appropriate drag setting on a dynamic ergometer for the purpose of improving on-water sculling speeds?

**A:** We would suggest that all DFs recommended above could work well for various training purposes. Remember, that **an erg is a cross-training tool for rowing** (RBN 2005/01). Rowing on the erg is the most similar exercise to rowing on the water; however, there are significant biomechanical differences between these efforts (RBN 2005/03, 2010/10). Training on an erg is mainly intended for development of power and endurance and can be done across a wide range of DFs: higher DFs are good for strength training; lower DFs can be used for speed training.

When testing on the erg, it is better to use a standardized DF, which allows the closest “heaviness” to on-water rowing. We proposed to use HDF factor for this purpose (RBN 2011/01), but the correspondence with the boat is quite approximate, because DF of water changes dramatically with weather conditions.