

Feedback & comments

✓ In RBN 68(7, 2006/11) we discussed the influence of the span/spread on gearing. Since then we received a number of comments from coaches like this: “I agree with your points. I’ve never understood why span/spread influence gearing”.

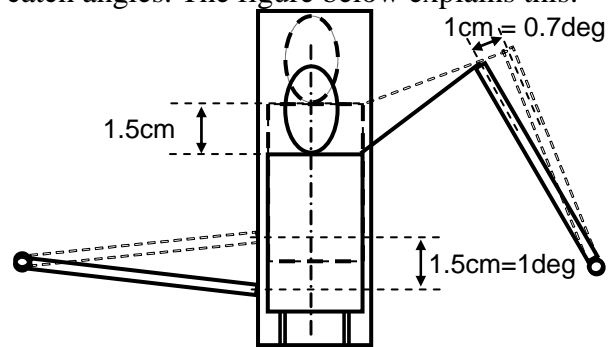
We tried to find origins of the span-gearing idea. Many thanks to Bruce Grainger, who pointed to Karl Adam and kindly supplied citations from his books (1, 2), which have been summarised for us by Volker Nolte with commentary as follows: "Adam’s ...theory is based on the idea ... that the rower’s force initiates on the foot-stretcher and he saw this force longitudinal to and in the middle of the boat. This would mean that the moment arm of this force always was the span (D for Dollenabstand). The blade force was perpendicular to the blade, so its moment arm was the outboard (A – Aussenhebel). Therefore, Adam defined his gearing as D/A. Since the outboard is normally about three times larger than the span, Adam concluded that 1 cm change in span is equal to 3 cm change of outboard." Volker continues, "This conclusion never sat well with me, since practical experience showed that changing the outboard had more of an effect than the span. So, I got in quite heated discussions with Adam about this. The problem is that his basic assumption of the position and direction of the handle force was incorrect.”

We completely agree with Volker’s point. The stretcher force is transferred through the riggers to the pin and the only difference between them is the relatively small force of the hull inertia. In fact, the same forces are applied by the rower to the stretcher and pin, so there is no lever between them from the rower’s point of view. Lateral movement of the pin does not change the gearing itself.

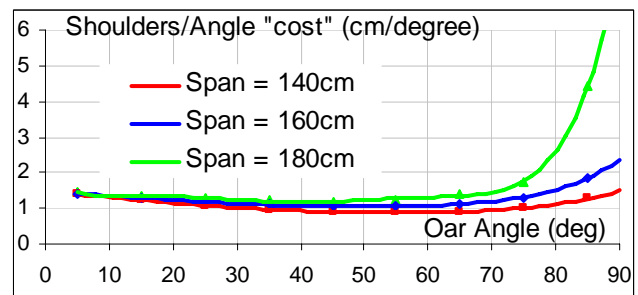
✓ We received another interesting comment from Einar Gjessing of Norway, creator of the famous “Ergorow” machine, which he patented in 1973. Einar has written: “The most important, but a missing parameter could be the influence of the ratio between handle and shoulder speed at the beginning of the stroke. If the rower’s arms at the catch are held perpendicular to the shell, then 12mm of the shoulders move correspond to only 4mm the handle (Ratio 3/1). In the middle of the stroke the ratio has decreased to 1/1. High ratio just after the catch indicates fast movement of the shoulders and is probably the main reason of the feeling of easy gearing. I hope this fact can be helpful in understanding relations between gearing

effect, span, catching angle, stretcher position and boat types.”

We agree with Einar that the ratio of the shoulders/handle movement can be higher at longer catch angles. The figure below explains this:



The chart below shows how much the oar angle “costs” in the shoulders movement at various oar angles and span for a common inboard (88cm) and dimensions of the athlete (shoulder to handle distance 70cm, shoulders width 40cm):



The “cost” increases significantly at angles greater than 70 deg and with a very wide span (180cm), which in practice can not be found in sculling and rowing. If even a huge difference in span (± 20 cm, which never happens in reality) can not change the “cost” significantly in the range of real angles, then what we can say about ± 2 cm?

Concluding, this effect is very small in practice and can not support the idea of span/spread influence on gearing.

By the way, this chart can be useful when you want to know how much you should move the stretcher to change the angle by one degree. At the perpendicular one degree “costs” about 1.45cm of the arc length in sculling and 1.75cm in rowing.

References

1. Adam K., Lenk H., Nowacki P., Rulffs M., Schroder W. 1977. *Rudertraining*. Limpert Verlag GmbH., Germany, pp. 98-99, 170
2. Adam K., Lenk H., Schroder W. 1982. *Kleine Schriften zum Rudertraining*. Bartels & Wernitz Druckerei und Verlag KG, Germany, pp.268-272.

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