Supplementary material to the paper:
“A customised Finn dinghy rudder for optimal Olympic performance”
In Proceedings of the 13th ISEA 2020, Tokyo, Japan, 2020

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Figure S1. Pressure distribution on the rudder surface during normal sailing conditions estimated via Computational Fluid Dynamics simulations.

Figure S2. Illustration of the sailor supporting condition where the load of the sailor is idealised as a point force F=1kN exerted at the tip of the tiller.
Table S1. Mechanical properties used for XPREG XC130 Prepreg Carbon (Toray T700S) 3K, 300 gsm.

| Property                                      | Value and unit |
|-----------------------------------------------|----------------|
| Areal weight (per ply, including resin)       | 447 g/m²       |
| Ply thickness                                 | 0.3 mm         |
| Longitudinal modulus                         | 135 GPa        |
| Transverse modulus                           | 8.6 GPa        |
| Out-of-plane modulus                         | 8.6 GPa        |
| In-plane shear modulus                       | 4.7 GPa        |
| Out-of-plane shear modulus                   | 3.1 GPa        |
| Major in-plane Poisson’s ratio               | 0.27 GPa       |
| Out-of-plane Poisson’s ratio                 | 0.4 GPa        |
| Longitudinal tensile strength                | 2550 MPa       |
| Transversal tensile strength                 | 69 MPa         |
| Out-of-plane tensile strength                | 69 MPa         |
| Longitudinal compressive strength            | 1470 MPa       |
| Transversal compressive strength             | 100 MPa        |
| Out-of-plane compressive strength            | 100 MPa        |
| In-plane shear strength                      | 60 MPa         |
| Out-of-plane shear strength                  | 32 MPa         |

1 Estimated value based on similar material with data from [6].

Table S2. Mechanical properties used for XPREG XC110 Prepreg Carbon (Pyrofil TR30S) 3K, 210 gsm, 2/2 Twill.

| Property                                      | Value and unit |
|-----------------------------------------------|----------------|
| Areal weight (per ply, including resin)       | 362 g/m²       |
| Ply thickness                                 | 0.25 mm        |
| Longitudinal modulus                         | 55.1 GPa       |
| Transverse modulus                           | 55.1 GPa       |
| Out-of-plane modulus                         | 7 GPa          |
| In-plane shear modulus                       | 19.5 GPa       |
| Out-of-plane shear modulus                   | 2.7 GPa        |
| In-plane Poisson’s ratio                     | 0.04 GPa       |
| Out-of-plane Poisson’s ratio                 | 0.3 GPa        |
| Longitudinal tensile strength                | 521 MPa        |
| Transversal tensile strength                 | 521 MPa        |
| Out-of-plane tensile strength                | 50 MPa         |
| Longitudinal compressive strength            | 483 MPa        |
| Transversal compressive strength             | 483 MPa        |
| Out-of-plane compressive strength            | 170 MPa        |
| In-plane shear strength                      | 125 MPa        |
| Out-of-plane shear strength                  | 65 MPa         |

1 Estimated value based on similar material with data from [6].