

Improvement of kayak Havsracer

For a given hull, small modifications can often be made that will decrease the resistance for a given stability or increase stability for a given resistance.

Kayak characteristics independent of paddler weight and cargo load

	Original kayak	Parameterized kayak	Improved kayak
Max width	0.444	0.438	0.46
One - sided keel angle midship, degrees	(0.922)	0.00103	0.00111
Paddler lowest point above keel	0.0118	0.0127	0.0129
Total volume	0.262	0.267	0.281
Cargo capacity	0.193	0.199	0.199

Kayak characteristics dependent on paddler weight and cargo load

	Original kayak	Parameterized kayak	Improved kayak
Paddler weight	79.64	79.64	79.64
Kayak weight	15.	15.	15.
Cargo weight	0.	0.	0.
Ballast weight	0.	0.	0.
Maximum waterline beam	0.417	0.414	0.42
Wetted surface	1.91	1.93	1.96
Total surface including openings	4.64	4.69	4.87
Righting moment at 5 degrees, Nm	3.88	3.86	3.88
Righting moment at 30 degrees, Nm	13.4	13.	14.6
Waterline in relation to bow	-0.169	-0.169	-0.171

Resistance

The program Flotilla (www.cyberiad.net) has been used to calculate resistance. The difference between the total resistance and the sum of skin and wave resistance is due to form resistance and splash resistance, which are not reported separately. These effects are small, however.

Flotilla takes account of the full geometry of the hull.

	Original kayak	Parameterized kayak	Improved kayak
Paddler weight	79.64	79.64	79.64
Kayak weight	15.	15.	15.
Test speed	2.06	2.06	2.06

	Original kayak	Parameterized kayak	Improved kayak
Frictional resistance	11.26	11.42	11.51
Wave resistance	1.323	1.384	0.79
Total resistance	13.05	13.31	12.79

	Original kayak	Parameterized kayak	Improved kayak
Frictional resistance	17.11	17.34	17.49
Wave resistance	1.751	1.671	1.162
Total resistance	19.56	19.77	19.36

	Original kayak	Parameterized kayak	Improved kayak
Frictional resistance	24.06	24.4	24.6
Wave resistance	6.746	6.127	4.359
Total resistance	31.74	31.53	29.88

Modifications of hull form

The solid lines show fore (left) and aft (right) half sections of the original kayak Havsracer, the long dash lines show the half sections at the same positions for the parameterized kayak and the short dash lines show the half sections for the improved kayak.

