Contents

Boat Speed Calculator

Boundaries

There are certain boundaries to the calculation methods. If the application specs are outside of the boundaries, the calculation might not be possible, or it might output highly inaccurate results.

Table 1. Boundaries

Boat hull type	• Hull type must be a monohull with constant (or almost constant) deadrise, aka monohedron hull. • Hulls with transversal steps cannot be calculated accurately.
Speed	• Method calculates speed up to 50kn • Boat must be powered sufficiently to reach planing condition. Speeds below planing condition cannot be calculated. • Best accuracy is reached in the region of 25…40kn.
Deadrise	• 0…30 degrees measured from mid-waterline or from transom if they are the same.
Propulsor type	• Either outboard engine or sterndrive • Contra-rotating propellers are out of boundaries at the moment
Number of propeller blades	• 3…4
Propeller pitch / diameter ratio	• 0.8…1.4
Propeller EAR	• 0.5…1.1
Running attitude	• The calculation method is not suitable for conditions of dynamic instability, such as chine walking, porpoising and bowsteering etc.
Cavitation	• The calculation method is not suitable for conditions of significant propeller or hull cavitation

Input Parameters

The significance column aims to indicate the criticality of each input parameter from least important (*) to most important (***).

Table 2. Input parameters

Parameter	Description	Significance
Craft mass [kg]	Craft total mass including fuel, crew and gear etc.	**
Deadrise [deg]	Deadrise angle measured in mid-waterline.	**
Chine beam [m]	Distance between outer chines at transom.	**
LCG [m]	Distance of lateral center of gravity from transom. Typically, 30…40% of waterline length or 75% of chine beam.	***
VCG [m]	Distance of vertical center of gravity from keel.	*
Shaft angle [deg]	Propeller shaft angle to keel.	*
Shaft distance to keel [m]	Vertical distance between propeller shaft neutral axis and center of gravity of the craft.	*
Windage [m^2]	Projected craft cross-sectional area above waterline. Hull + superstructure.	*
Number of propellers	Number of drivelines	***
Skeg thickness [m]	Thickness of propeller skeg at fin	*
Skeg chord [m]	Skeg chord at mid-span	*
Skeg span [m]	Skeg max span from waterline	*
Gear ratio [n:1]	If gear ratio is given 2:1, use 2. If gear ratio is given 1:2, use 0.5 etc.	***
Engine shaft speed [1/min]	Engine RPM before gearbox	***
Propeller blade number	Number of propeller blades / propeller	***
Propeller EAR	Propeller expanded area ratio	**
Propeller diameter [m]	Diameter of propeller.	***
Propeller pitch [m]	Distance the propeller travels theoretically in one rotation.	**

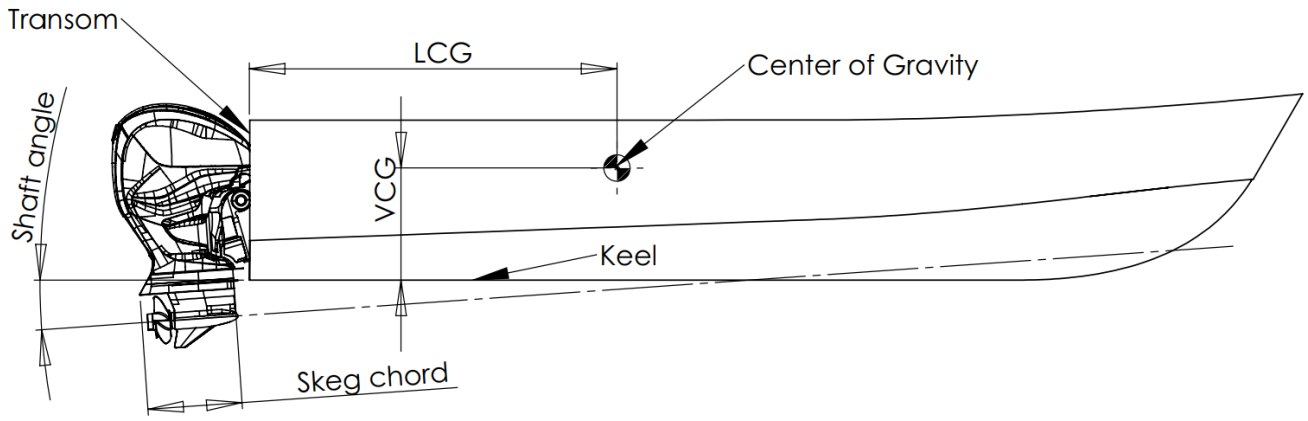


Figure 1. Input parameters (1)

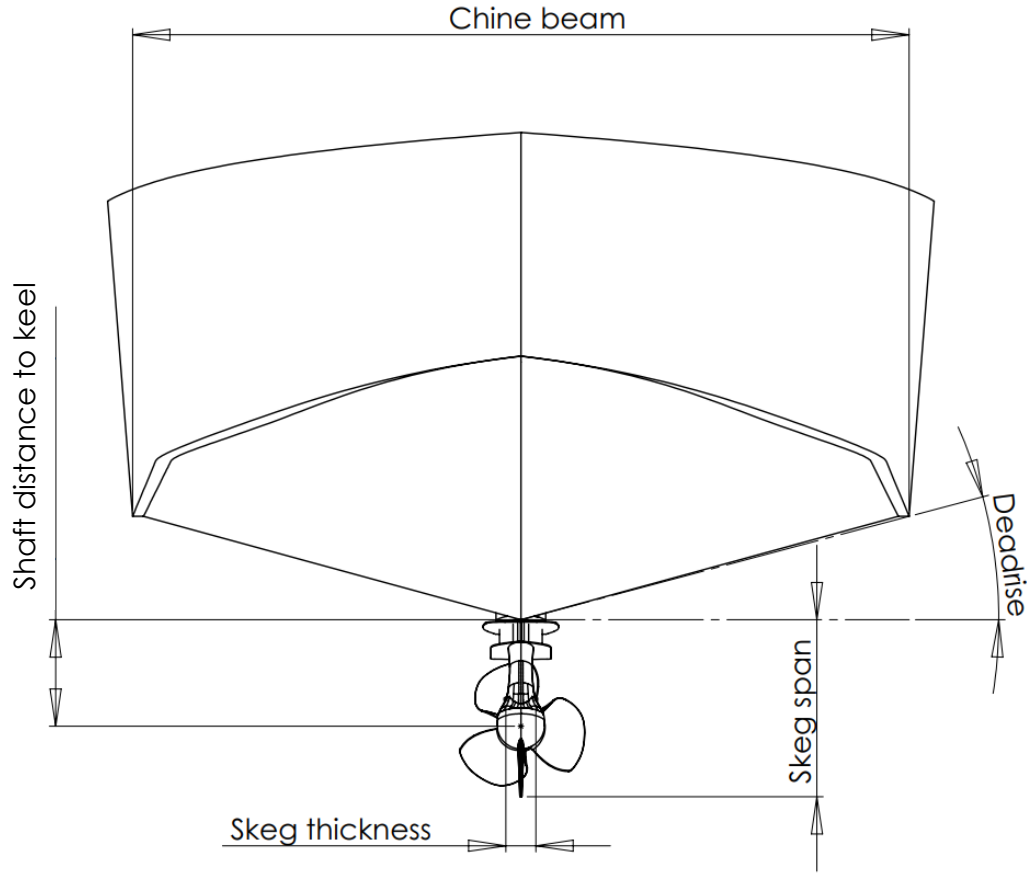


Figure 2. Input parameters (2)

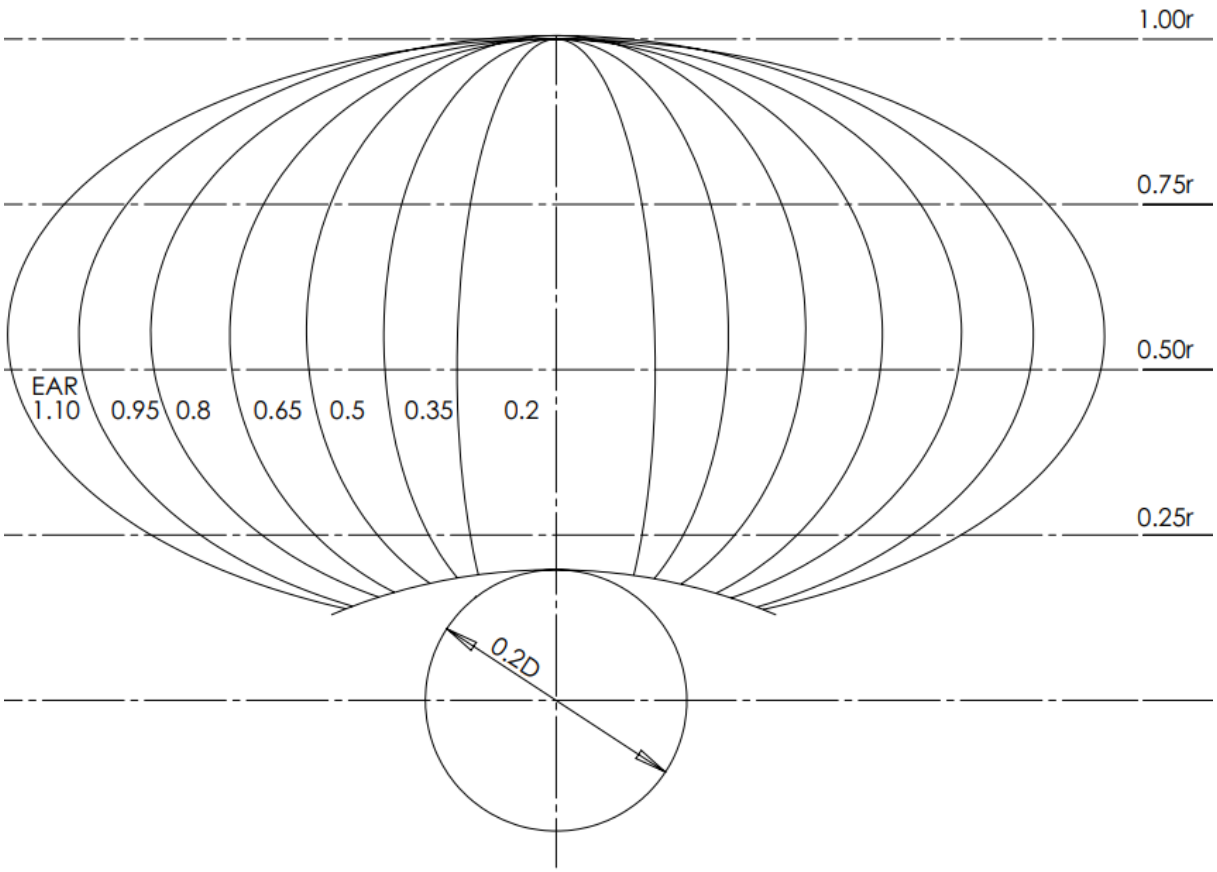


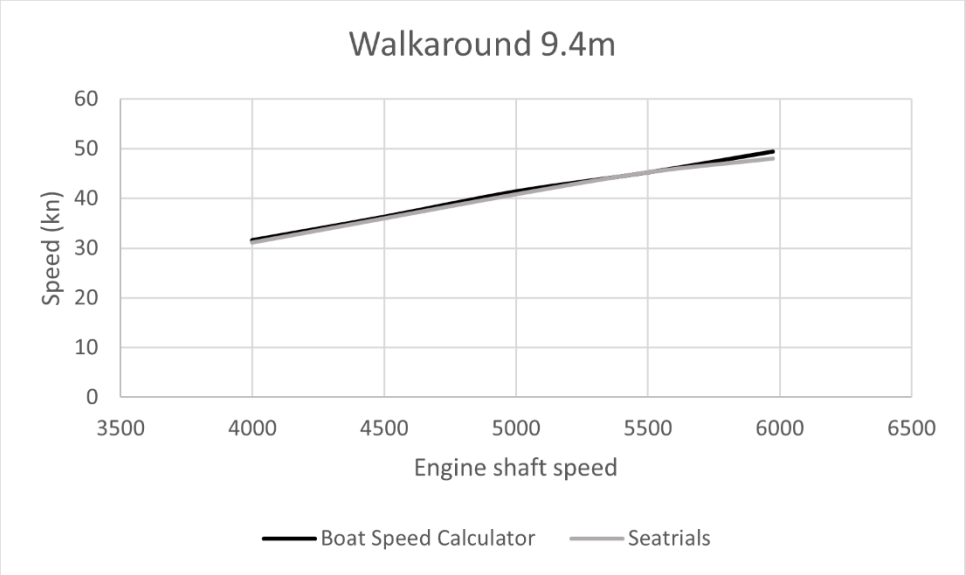
figure 3. Input parameters (3)

Example Cases & Validation

Example 1. Walkaround 9.4m

Input	Value	Unit
Mass	5416	kg
Deadrise	20	deg
Chine beam	3.15	m
LCG	2.36	m
VCG	0.85	m
Shaft angle	4	deg
Shaft distance to keel	0.5	m
Windage	10	m^2
Number of propellers	2	-
Skeg thickness	0.1	m
Skeg chord	0.4	m
Skeg span	0.5	m
Gear ratio	1.75	-
Propeller blade number	3	-
Propeller EAR	0.65	-
Propeller diameter	0.39	m
Propeller pitch	0.48	m

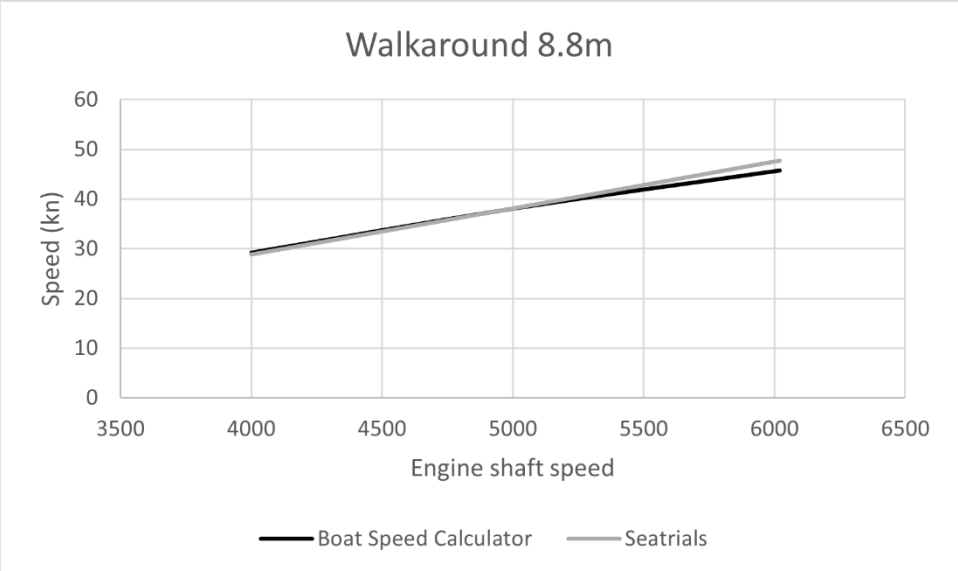
	Calculated speed	Actual speed from seatrials	
RPM	Kn	Kn	error
4000	31.6	31.11	1.6 %
4500	36.3	35.97	0.9 %
5000	41.4	40.84	1.4 %
5500	45.2	45.27	0.2 %
5975	49.4	48.05	2.8 %



Example 2. Walkaround 8.8m

Input	Value	Unit
Mass	4200	kg
Deadrise	21	deg
Chine beam	3.1	m
LCG	2.325	m
VCG	0.8	m
Shaft angle	0	deg
Shaft distance to keel	0.5	m
Windage	8	m^2
Number of propellers	2	-
Skeg thickness	0.1	m
Skeg chord	0.4	m
Skeg span	0.5	m
Gear ratio	1.85	-
Propeller blade number	3	-
Propeller EAR	0.65	-
Propeller diameter	0.37	m
Propeller pitch	0.48	m

	Calculated speed	Actual speed from seatrials	
RPM	Kn	Kn	error
4000	29.2	28.85	1.2 %
5000	38.1	38.14806	0.1 %
6020	45.8	47.7937	4.2 %



Example 3. Bowrider 8.3m

Input	Value	Unit
Mass	2314	kg
Deadrise	24	deg
Chine beam	2.4	m
LCG	2	m
VCG	0.8	m
Shaft angle	0	deg
Shaft distance to keel	0.5	m
Windage	6	m^2
Number of propellers	1	-
Skeg thickness	0.1	m
Skeg chord	0.4	m
Skeg span	0.5	m
Gear ratio	1.5	-
Propeller blade number	4	-
Propeller EAR	0.65	-
Propeller diameter	0.37	m
Propeller pitch	0.53	m

	Calculated speed	Actual speed from seatrials	
RPM	Kn	Kn	Error
2500	21.4	20.9	2.4 %
3000	28.6	28	2.1 %
3500	34.4	34.2	0.6 %
4000	39.6	39.5	0.3 %
4500	44.7	44.5	0.4 %
5000	49.9	52.5	5.0 %