Power Prediction
Release 3

WOLFSON UNIT

FOR MARINE TECHNOLOGY AND INDUSTRIAL AERODYNAMICS

Power Prediction Program

The Power Prediction program calculates the powering requirements of vessels covering a large range of hull forms from merchant ships to planing vessels, using a variety of analytical and regression methods.

Four proprietary Wolfson regressions are supplied, which draw upon 50 years' worth of model tests conducted by the Wolfson Unit.

The program can calculate the added resistance of appendages and the effect of changes in hull form parameters. In addition to calculating the resistance and EHP, the program also calculates the propulsive coefficients for each speed.

Release 3 features include:

- **Feedback on ranges and envelopes.** The current, user defined hull form parameters and speed range are compared to the domain of applicability of the selected calculation method. The user may cycle through multiple cases, if required.
- **Body plan library.** Typical hull form(s) are displayed for the selected calculation method, if applicable.
- **Improved help system.** Context-sensitive (F1) interface, HTML manual and help hints.
- **Windows 10 compliance.**

Other program features include:

- **Appendage library.** Includes standard components such as skeg or shaft and user-defined components created from up to ten standard types.
- **Design cases.** Allows multiple sets of calculations to be defined based upon variations of the hull and appendages.
- **Reporting.** The results of calculations are displayed as web pages, which may then be copied or printed.

Results Output

Data are tabulated to include the Resistance, Effective Power, and standard propulsive coefficients.

Results can be transferred directly into the **Wolfson Unit's Propeller Design Program** to allow propeller selection, and the two programs can be run together to investigate parametric variations.

Results in HTML format with built in results browser to produce neat, readable and quickly navigable tables.

Results can be output in imperial or metric units, depending on the units used in the hull definition.

Graphic output is automatically generated in the HTML report, which can be copied directly as a stand-alone report.

Compatibility

Export files for use with, and automatically run, the **Wolfson Unit's Propeller Design Program**. Save results as formatted HTML or paste into other programs such as word processors.

Plot results using the **Wolfson Unit's** general plotting program **GoPlot**.

Help System

Full online help system describing the methods and calculation process.

Help system includes examples of appendage definition (e.g. rudders, P Brackets, skegs etc).

Full glossary of terms showing the derivation of calculated data.

Price information

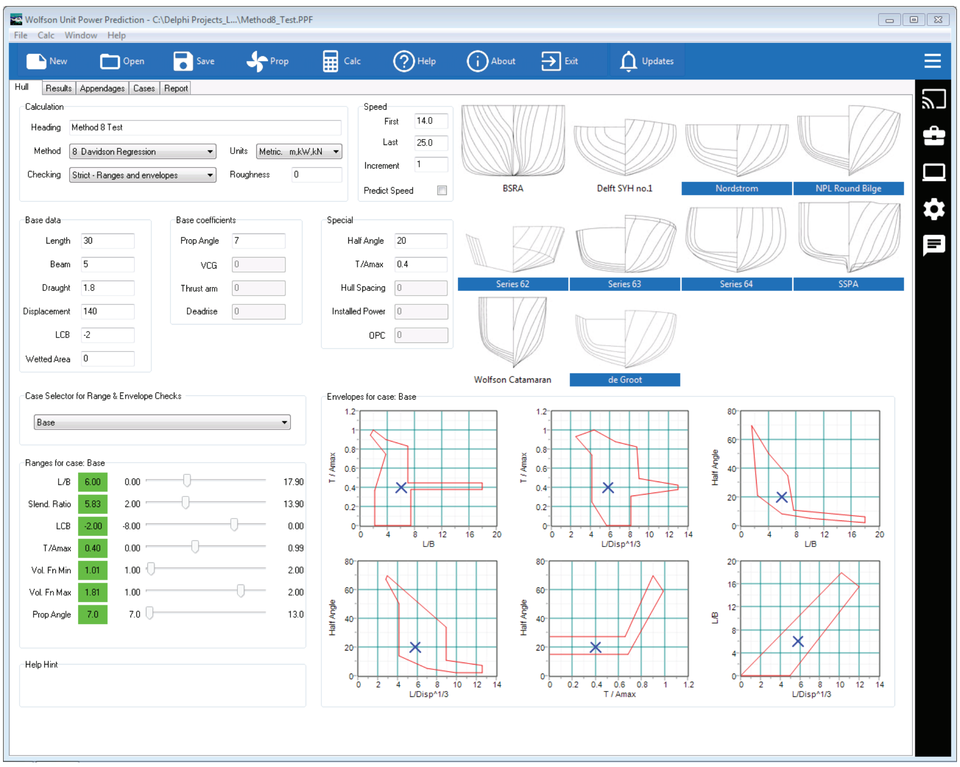
Please see www.wolfsonunit.com/software/price-list

Second copies available at 65%, subsequent copies at 50% of price.

Educational discount of 33% on total price.

Time-limited licensing is available.

Price includes software support from WUMTIA engineers.



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Calculation Methods

The method used to calculate the resistance of the ship depends upon the type of vessel. Each method has valid ranges, for speed, length/beam ratio etc. The parameters (e.g. Length) used to define the ship, vary between methods:-

Planing Craft

WOLFSON UNIT HIGH SPEED CHINE CRAFT

This series is a regression of 104 hard chine models tested at the Wolfson Unit since 1999, unpublished. The regression is similar to the original hard chine methods, but the hulls have been chosen to allow calculations up to volume Froude numbers of 5.0. The data are all taken from test models which have been optimised for trim, either by positioning the LCG, or by trim tabs, wedges or transom mounted interceptors. The effects of varying wetted surface area with speed are automatically taken into account. In order to allow for surface roughness, a separate regression of wetted area against speed is made.

WOLFSON UNIT CHINE CRAFT

This series is a regression of 66 hard chine models tested at the Wolfson Unit since 1968, by J. Robinson. The regression calculates a comparative performance coefficient over a range of volume Froude numbers, up to 3.0. The data are all taken from test models which have been optimised for trim, either by positioning the LCG, or by trim tabs or wedges. The effects of varying wetted surface area with speed are automatically taken into account. In order to allow for surface roughness, a separate regression of wetted area against speed is made.

SAVITSKY PLANING PREDICTION

This routine is based upon a computational procedure presented by D. Savitsky. The calculations are based upon hydrodynamic planing equations describing lift, drag, wetted area, centre of pressure and trim, as a function of speed, deadrise and loading. An equilibrium trim condition is determined allowing the calculation of horsepower, wetted length and porpoising stability. The program incorporates an extra iteration loop to allow for reducing beam at high speeds.

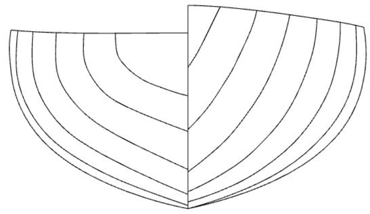
DAVIDSON REGRESSION FOR ROUND BILGE AND PLANING CRAFT

This analysis is based upon a Davidson Laboratory report by J. Mercier and D. Savitsky, which presents a 14 term regression equation for specific resistance based on five hull parameters: length/displacement ratio, beam loading, half angle of entry, LCB at rest and the ratio of immersed transom area to maximum section area. The equation was derived from 7 model series tests, one of which was a hard chine form, from which is calculated the calm water resistance and Effective Horsepower, this method also calculates the propulsive coefficients for each of the speeds.

Yacht Hullforms

DELFT SYSTEMATIC YACHT HULL SERIES

This series is a regression of 40 hull form variations of sailing yacht hulls, presented in papers by J. Gerritsma and J. A. Keuning. The regression is used in order to calculate the upright residuary resistance of a yacht canoe body, to which frictional resistance for an entered or calculated wetted area is added. The effects of keels, bulbs and rudders can be added via the standard appendage options.

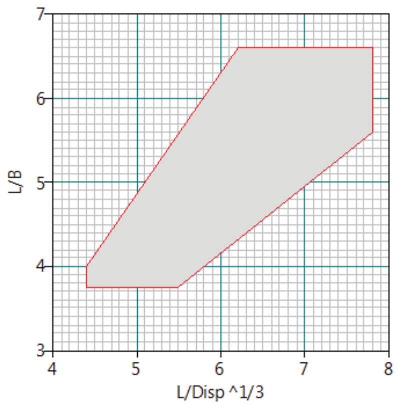


Parent body plan for Delft Systematic Yacht Hull Series

Displacement & Semi-Displacement

WOLFSON UNIT ROUND BILGE MEGAYACHT

This series is a regression of round bilge megayacht models tested at the Wolfson Unit since 2000. The regression calculates a comparative performance coefficient over a range of volume Froude numbers, up to 1.1. The data are all taken from test models which have been optimised for trim, either by positioning the LCG, or by applying trim control devices such as transom mounted interceptors. The effects of varying wetted surface area with speed are automatically taken into account. In order to allow for surface roughness, a separate regression of wetted area against speed is made.



Envelope of NEW Wolfson Round Bilge Megayacht Series

WOLFSON UNIT ROUND BILGE

This series is a regression of 30 round bilge models tested at the Wolfson Unit since 1968, by J. Robinson. The regression calculates a comparative performance coefficient over a range of volume Froude numbers, up to 2.75, which is then faired and used to obtain the vessel's total resistance. The data are all taken from test models which have been optimised for trim, either by positioning the LCG, or by trim tabs or wedges. The effects of varying wetted surface area with speed area automatically taken into account. In order to allow for surface roughness, a separate regression of wetted area against speed is made.

NPL ROUND BILGE CRAFT

This analysis is based upon work presented by D. Bailey, and was developed from a large data base and consists of an interpolation of the residuary resistance of a vessel over a wide range of Froude numbers, for different length/displacement and length/beam ratios. An ITTC 1957 frictional coefficient is calculated and the total resistance and Effective Horsepower computed, for high speed round bilge hull forms in the Froude number range 0.24 - 1.22. In addition to calculating the resistance and EHP, this method also calculates the propulsive coefficients for each of the speeds.

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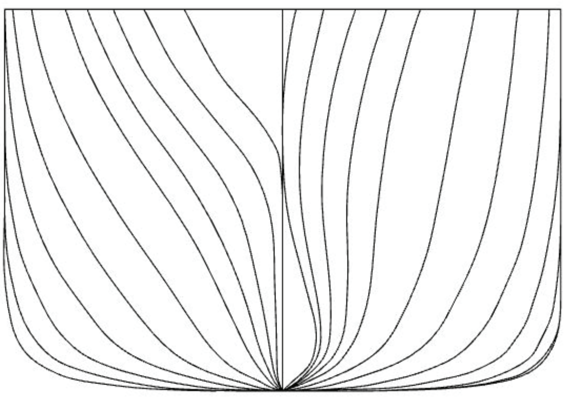
SERIES 64

This analysis is based upon work published by H. Yeh. It uses a wide range of hull parameters from which to calculate calm water resistance and Effective Horsepower, this method also calculates the propulsive coefficients for each of the speeds.



Parent body plan for BSRA Series

TUGS AND TRAWLERS METHOD

This analysis is based upon work published by G. van Oortmerssen. The method was developed through a regression analysis of data from 93 models of tugs and trawlers obtained by the Netherlands Ship Model Basin. It uses a wide range of parameters from which to calculate calm water resistance and Effective Horsepower of tugs and trawler forms in the Froude number range 0.1 - 0.5. In addition to calculating the resistance and EHP, this method also calculates the propulsive coefficients for each of the speeds.

BSRA METHOD

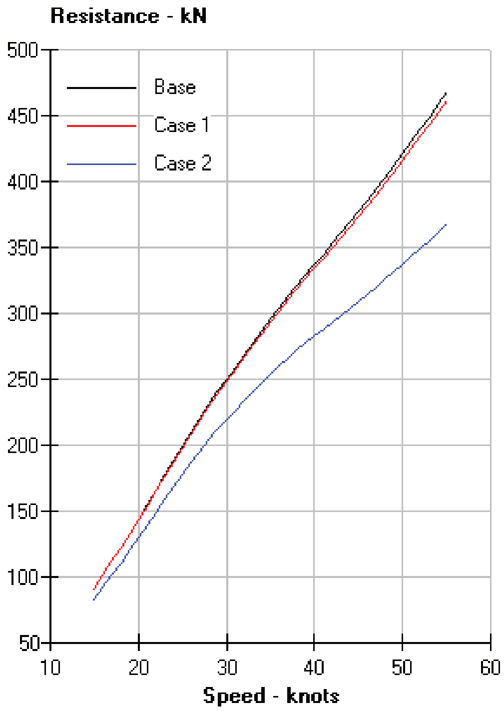
This analysis is based upon work published by M. Parker, and a regression analysis reported by A. Sabit. The method was developed through an analysis of the BSRA Methodical Series data. It uses a wide range of hull parameters from which to calculate calm water resistance and Effective Horsepower in the Froude number range of 0.15 - 0.24. In addition to calculating the resistance and EHP, this method also calculates the propulsive coefficients for each of the speeds.

SSPA SERIES

This analysis is based upon work published by H. Lindgren and A. Williams. It considers a wide range of hull parameters from which to calculate calm water resistance and Effective Horsepower, this method also calculates the propulsive coefficients for each of the speeds.

SINGLE AND TWIN SCREW SHIPS

These analyses are based upon work published by J. Holtrop and G. Mennen, and were developed through a regression analysis of random model and full scale data obtained by the Netherlands Ship Model Basin. A wide range of hull parameters are used from which to calculate calm water resistance and Effective Horsepower of single and twin screw merchant ships in the Froude number range 0.16 - 0.45. In addition to calculating the resistance and EHP, the methods also calculate the propulsive coefficients for each of the speeds.

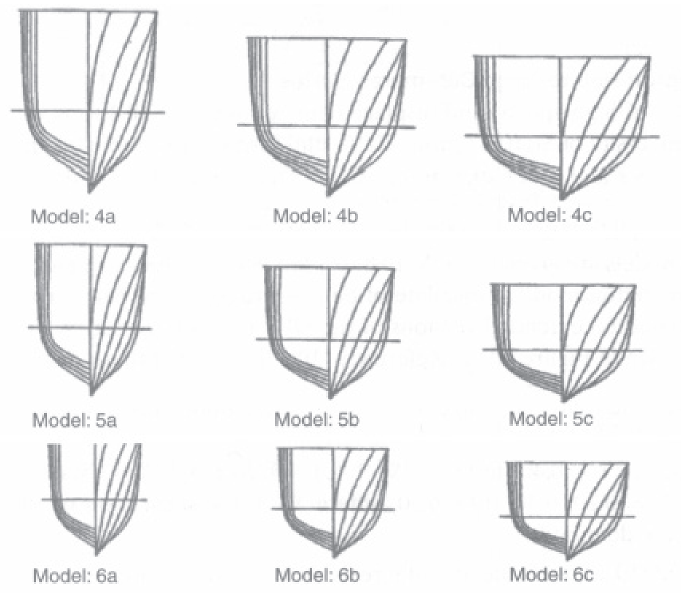


Family of calculated resistance curves

Catamarans

WOLFSON UNIT CATAMARAN CRAFT

This series is a regression of 13 parametric variants of round bilge semi-displacement demi-hulled catamarans, tested in the University of Southampton, and described in Molland et al. The regression calculates the residuary resistance, and interference factors, over a range of Froude numbers, up to 1.0, for varying length-displacement, length-beam, and hull spacing ratios. The model tests were performed on demi-hulls of the NPL round-bilge series, extended to high length-displacement and length-beam ratios.



Model body plans for Wolfson Catamaran Series

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