



PropElements®

What Is HydroComp PropElements?

HydroComp *PropElements* is software for detail propeller design and analysis.

Who Should Use PropElements?

Propeller specialists will find *PropElements* an essential addition to their propeller “design for performance” toolbox, but it also was developed to elegantly address the system-level hydrodynamic needs of naval architects.

What Propellers Can I Evaluate With PropElements?

PropElements is for the design and analysis of open or ducted sub-cavitating propellers. The blade is described by radially-varying foil parameters (such as chord, thickness, camber, pitch), and a variety of reference foil types are available to capture blade profile shape. For ducted propellers, *PropElements* supports standard nozzle styles (such as 19A and 37) and also tunnel thrusters and high-efficiency nozzles.

Does PropElements Consider The Vessel?

Through definition of the radial wake distribution, *PropElements* provides the ability to uniquely capture the performance of a particular propeller on a particular vessel. For a propeller design, a true “wake-adapted” optimal solution can be delivered.

How Does PropElements Work?

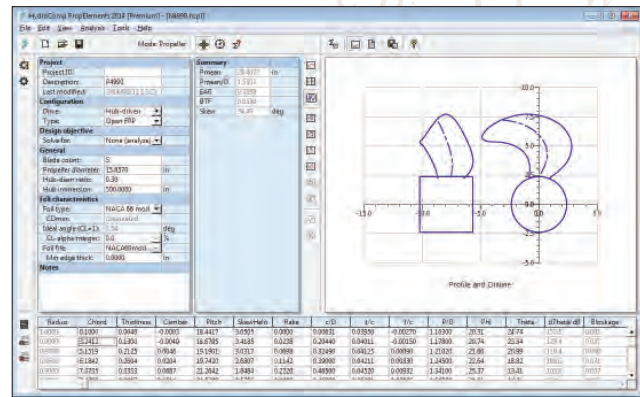
The method employed in *PropElements* is often referred to as a “hybrid lifting-line lifting-surface model”, with a unique implementation of a scalable viscous vortex lattice lifting-line code as its foundation. Much more than a simple academic lifting line utility, *PropElements* offers a reliable and accurate tool to predict propeller performance that is only made possible through HydroComp’s in-house R&D and our experience in hybrid empirical-numerical hydrodynamics.

Is PropElements Accurate?

Quantitative validation against test data is a crucial step in the development process at HydroComp. Extensive validations studies for *PropElements* have confirmed that it is unmatched in prediction accuracy.

Detail propeller design and analysis

$$\tan(\beta_i) = \frac{\tan(\beta)}{c n} \left(\frac{1-w}{1-w'} \right)''$$



Sample PropElements Data Screen

How Are Data And Reports Managed In PropElements?

Data can be manually developed using *PropElements*’ own editing functions. Existing design data can also be transferred by spreadsheet copy-paste, or by editing the text-based *PropElements* design file. Output is provided in both reports and plots.

Does PropElements Interface With Other Software?

A design can also be shared with other software for a complete design cycle solution. A number of Import and Export options make *PropElements* an important companion for HydroComp’s *NavCad* and *PropCad* software, as well as the perfect pre-processor for higher-order flow codes and CFD.





PropElements®

$$\tan(\beta_i) = \frac{\tan(\beta)}{c \eta_i} \left(\frac{1-w}{1-w_i} \right)^{1/2}$$

Technical Specifications

Calculation Groups

Project • Geometry • Performance • Strength • KT-KQ

Water Types

Fresh • Salt • Brackish • Custom

Solve For

Pitch + Camber (ideal) • Pitch • Thrust

Configuration

Open FPP • Ducted FPP • In tunnel

Foil Definition

Generic • NACA 66 mod • Bi-Circular • Segmental • Custom

Velocities

Axial only • Axial and tangential

Wake Distribution

User entered • From wake file

Tip and Hub Corrections

Custom unloading • Hub image • Hub drag

Advanced Analyses

Proprietary HydroComp 3D corrections • Optimum circulation

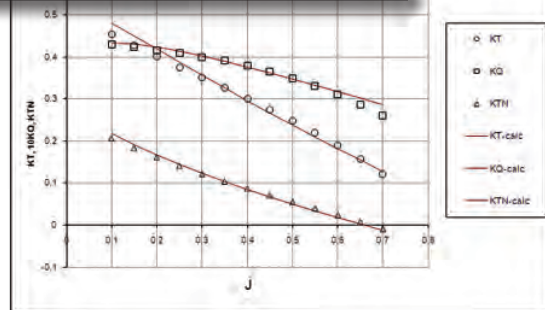
Materials

Mn bronze • NiAl bronze • St steel • Custom

KT-KQ

Constant speed • Constant RPM • Constant Rn07R

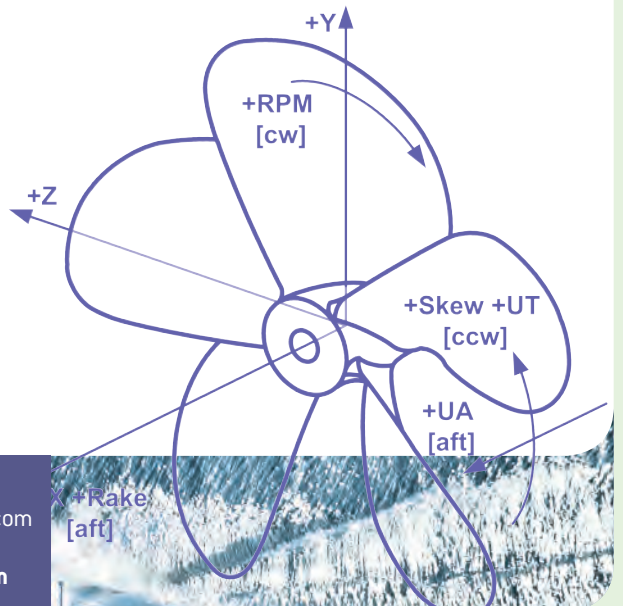
Project/Geometry		Project ID	Description	Hub diam					
11-Feb-14 12:23 HydroComp PropElements 2012 (Premium)		P4990	N4990.hcp						
FPP type		FPP	Temp	Configuration					
Density	999.10 kg/m3			Open FPP					
Viscosity	1.1308e-6 mPa·s								
Solve for	None (analyze)								
Blade count	5	Foil type	NACA 66 mod						
Diameter	15.8570 in	CMon	1.54 deg						
Hub-diameter ratio	0.3	Ideal angle (CL=1)	0%						
Hub immersion	500.0000 in	Angle BT margin	NACA66mod.toll						
		Foil file							
Summary									
Element ID	Element ID	EAR	BTP	Slave ID					
24.4877	1.5292	0.7898	0.6530	34.48					
Sections data									
r/R	Chord (in)	Thickness (in)	Camber (in)	Pitch (in)	Phi (deg)	c/D	tc	tc/c	P/D
1.0000	0.1000	0.0040	-0.0003	18.4417	20.31	0.0063	0.0395	-0.0027	1.1630
0.9900	3.5412	0.1300	-0.0049	18.6795	20.74	0.2044	0.0401	-0.0015	1.1780
0.9700	5.1519	0.2125	-0.0046	19.1901	21.66	0.3269	0.0412	0.0009	1.2102
0.9500	6.1842	0.2804	-0.0204	19.7420	22.64	0.3900	0.0421	0.0003	1.2450
0.9000	7.2705	0.3353	-0.0607	21.2642	25.37	0.4650	0.0422	0.0001	1.3410
0.8000	7.4369	0.4017	-0.1154	24.5308	31.81	0.4690	0.0540	0.0204	1.5470
0.7000	6.8699	0.4408	-0.1887	27.2922	38.51	0.4260	0.0602	0.0203	1.7190
0.6000	5.7402	0.4645	-0.1711	28.4633	43.60	0.3020	0.0800	0.0298	1.7950
0.5000	4.7888	0.4822	-0.1100	27.4885	47.78	0.3020	0.1007	0.0230	1.7510
0.4000	3.8247	0.5055	-0.0405	24.0392	50.34	0.2412	0.1400	0.0190	1.5160
0.3500	3.3284	0.6057	-0.0177	21.5655	51.04	0.2099	0.1820	0.0063	1.3600
0.3000	2.8162	0.7044	-0.0007	18.7589	51.48	0.1778	0.2501	0.0020	1.1830
r/R	Slave	Blockage							
1.0000	24.74	0.001							
0.9900	23.34	0.007							
0.9700	20.99	0.060							
0.9500	18.82	0.071							
0.9000	13.41	0.087							
0.8000	4.12	0.096							
0.7000	-4.12	0.103							
0.6000	-7.96	0.113							
0.5000	-9.75	0.121							
0.4000	-1.93	0.175							
0.3500	-4.53	0.223							
0.3000	0.00	0.301							



Sample PropElements Report (top) and Validation Study



To order, please contact HydroComp, Inc. or this authorized representative:



For license and ordering information, please contact:

HydroComp, Inc.
13 Jenkins Court
Suite 200
Durham, NH 03824 USA

T: [603] 868-3344
E: info@hydrocompinc.com
www.hydrocompinc.com