Calculation optimal propeller for selected engine

Input variables

Specified engine power [kW]	: 8058.00
Freq. of propeller rotation [1/min]	: 120.30
Number of propellers	: 1
Water density [kg/m3]	: 1025.000
Wake fraction Wt	: 0.289
Thrust deduction fraction t	: 0.219
Coef.infl.nonuniform on thrust	: 1.028
Coef.infl.nonuniform on torque	: 1.000
Efficiency of shaft	: 0.980
Efficiency of gear	: 0.980
Number of diagram	: 1
Blade number	: 4
Disk ratio Ae/Ao	: 0.550
Coef.infl. hull on diameter	: 1.050
Waited speed ship [knots]	: 13.130

Speed ship [kn]	: 11.13	12.25	13.38	14.50	15.95
Resistance [kN]	: 393.00	479.10	583.70	712.10	932.80

Results of calculation optimal propeller for selected engine

Table

Value	Measurem	Meanings				
Vs	[kn]	13.13	13.98	13.93	0.000	0.000
Va	[m/s]	4.800	5.112	5.093	0.000	0.000
R	[kN]	558.7	649.0	642.8	0.000	0.000
Pe	[kW]	3774.	4668.	4606.	0.000	0.000
Tb	[kN]	715.0	830.5	822.6	0.000	0.000
Knt	[-]	0.660	0.677	0.676	0.000	0.000
Jopt	[-]	0.420	0.429	0.429	0.000	0.000
J	[-]	0.441	0.451	0.450	0.000	0.000
D	[m]	5.427	5.655	5.639	0.000	0.000
Kt	[-]	0.200	0.197	0.197	0.000	0.000
ETAo	[-]	0.521	0.528	0.528	0.000	0.000
P/D	[-]	0.809	0.813	0.813	0.000	0.000
ETAd	[-]	0.589	0.596	0.596	0.000	0.000
Ps	[kW]	6672.	8152.	8042.	0.000	0.000

Propeller characteristics are:
D=5.639 m; P/D=0.813; Ae/Ao=0.550; Z=4
J=0.450; Kt =0.197; 10*Kq=0.267; ETAo=0.528
e/D=0.050; d?D=0.180; Hi = 15.000 degr

Calculation of propeller on cavitation by a method of Papmehl:
nkr=154.148 1/min
n < 0.9*nkr ==> OK! Propeller is not cavitate.

Calculation of propeller on general strength for r/D=0.3:

Num	Charact.	Meas.	MEANINGS
1	Bmax	[m]	1.672
2	Bl	[m]	1.437
3	e	[m]	0.226
4	fi	degr	40.785
5	Gp	-	0.400
6	Gt	-	1.100
7	Mp	kN*m	231.935
8	Mt	kN*m	86.324
9	F	[m2]	0.230

10	Wdz	[m3]				0.00621				
Propeller's metal:			1	2	3	4	5	6	7	8
11	G	[kg]	567.8	594.8	527.2	574.6	520.5	520.5	534.0	189.3
12	Pc	[kN]	119.4	125.1	110.9	120.8	109.5	109.5	112.3	39.80
13	Mc	kN*m	29.68	31.09	27.56	30.03	27.21	27.21	27.91	9.893
14	Sigma	N/mm2	40.96	41.13	40.70	41.00	40.66	40.66	40.74	38.55
15	SigmaC	N/mm2	0.519	0.544	0.482	0.525	0.476	0.476	0.488	0.173
16	SigmaS	N/mm2	41.48	41.68	41.18	41.53	41.13	41.13	41.23	38.72
17	SigmaB	-	4.701	5.159	5.439	5.827	6.613	7.099	10.62	11.11
18	SigmaB/4	-	1.175	1.290	1.360	1.457	1.653	1.775	2.656	2.776

Note: Propeller's metal: 1-brass Mn+Fe; 2-bronze Al+Fe H9-4-4; 3-carbon steel;
4-brass Al+Mn+Fe; 5-bronze Neva-60; 6-bronze Neva-70; 7-stainless steel; 8-duralumin.

If SigmaB > 1 ==> Propeller is a strong in uniform flow.
If SigmaB/4 > 1 ==> Propeller is a strong in non-uniform flow.