

**TIMBOLIER INDUSTRIES INC.  
REPORT FROM NAVAL ARCHITECT**

**Propeller Selection Analysis Data Form**

<b>1. Client</b>			
Name:	<i>J. Thomas</i>	Email:	<a href="mailto:info@timbolier.com">info@timbolier.com</a>
Company:	<i>Timbolier Industries</i>	Website:	<a href="http://www.timbolier.com">www.timbolier.com</a>

<b>2. Project information</b>	
Vessel name:	<i>Night Fury</i>
Notes:	Vessel came with 28x32x3 blade props which provided a top speed of about 30kn. Customer wishes to switch to a four-blade to achieve better planing at a lower RPM and smoother ride. Hull submerged volume is 711 cubic feet. Manufacturer states that shaft HP is 725@2300 which I believe is after the transmission.

<b>3. Vessel</b>			
NOTE: All calculations will be based on this data, so this should reflect the principal operating condition of the vessel. If possible, attach a photograph of the vessel, Lines Plan and General Arrangement drawings.			
Hull type:	<i>Planing</i>	Length overall (ft):	<i>50.00</i>
Service:	<i>Passenger / Pleasure</i>	Length waterline (ft):	<i>44.30</i>
Water type:	<i>Salt</i>	Load condition weight (lb):	<i>44000</i>
Propellers:	<i>Twin</i>	Design top speed (kts):	<i>30.0</i>
Max. prop diameter (in):	<i>28</i>	Design cruise speed (kts):	<i>25.0</i>
Prop center to WL (in):	<i>40</i>	Desired number of blades:	<i>4</i>
Prop style:	<i>Open</i>		

<b>4. Engine/Gear</b>			
If possible, please attach an engine performance curve data			
Model:	<i>J&amp;T 8V92TIB</i>	Design power (%):	<i>100</i>
Manufacturer:	<i>Detroit Diesel (Johnson &amp; Tower)</i>	Design RPM (%):	<i>100</i>
Rated power (hp):	<i>735</i>	Parasitic loss (hp):	
Rated RPM:	<i>2300</i>	Gear type:	<i>Capital HY20000</i>
Fuel type:	<i>Diesel</i>	Gear ratio:	<i>1.533:1</i>
Fuel rate (gal/hr):	<i>40gph/Engine WOT</i>	Gear efficiency:	<i>0.97</i>

<b>5. Prior trial data (if available)</b>			
NOTE: Information about prior trial performance of the vessel (or one exactly like it) will improve the accuracy and reliability of the analysis. This data should be for typical operation condition.			
Vessel weight (lb):	<i>44000</i>	Prop. Model:	<i>Dynajet</i>
Trial speed (kts):	<i>30.5</i>	Series:	<i>GawnAEW</i>
Trial RPM:	<i>2300</i>	Blades:	<i>3</i>
Eng. model:	<i>8V92TIB</i>	Blade area ratio:	<i>0.51</i>
Rated power (hp):	<i>735</i>	Diameter (in):	<i>28</i>
Rated RPM:	<i>2300</i>	Pitch (in):	<i>32</i>
Gear ratio:	<i>1.533:1</i>	Cupping:	<i>0,25% D</i>

# Summary Report

18-map-2019

Project: **Night Fury - new a four-blade prop**  
 Vessel: **Night Fury**



For  
 J. Thomas

## Vessel

Vessel type	<b>Planing</b>	Length [On WL]	<b>44.3 ft</b>
Service	<b>Passenger/Pleasure</b>	Weight	<b>44000 lb</b>
Water type	<b>Salt</b>	Speed/power by	<b>Prior trial</b>
Propellers	<b>2</b>	Avg. hull mult	<b>0.859</b>
Max. diameter	<b>28.0 in</b>		
Immersion	<b>40.0 in</b>		
Propeller style	<b>Open</b>		

## Engine

Model	<b>J&amp;T 8V92TIB</b>	Design power [735 hp]	<b>100 %</b>
Manufacturer	<b>Detroit Diesel (Johnson &amp; Towers)</b>	Design RPM [2300]	<b>100 %</b>
Fuel type	<b>Diesel</b>	Parasitic loss	<b>0 hp</b>
Rated power	<b>735 hp</b>	Gear efficiency	<b>0.970</b>
Rated RPM	<b>2300</b>		
Fuel rate	<b>40.0 gal/hr</b>		

## Sizing

Model	<b>Custom made</b>	Calc. sizing for	<b>Top</b>
Manufacturer	<b>Timbolier Industries</b>	Design speed	<b>36.0 kts</b>
Series	<b>GawnAEW</b>	Blade area ratio [Size]	<b>0.783</b>
Blades	<b>4</b>	Diameter [Keep]	<b>28.0 in</b>
Cup type	<b>Very Light</b>	Pitch [Size]	<b>33.3 in</b>
Cup drop	<b>0.070 in</b>	Gear ratio [Keep]	<b>1.533</b>
Propeller material	<b>NiAl Bronze</b>	Calc'd max. speed	<b>36.0 kts</b>

## Analysis

Speed [kts]	Engine RPM	Power [hp]	Thrust [lbf]	Cavitation	Strength
<b>36.0 (Top)</b>	<b>2300</b>	<b>735</b>	<b>4522</b>	<b>Breakdown</b>	<b>OK</b>
<b>25.0 (Cruise)</b>	<b>1678</b>	<b>394</b>	<b>3445</b>	<b>OK</b>	<b>OK</b>
<b>30.5 (Trial)</b>	<b>2300</b>	<b>675</b>	<b>4007</b>	<b>Breakdown</b>	

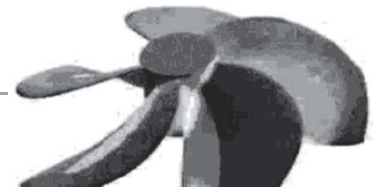
## Notes

This evaluation has been carefully prepared to meet professional standards. Since it is not possible to determine the accuracy of the provided data, the preparer of this report assumes no liability nor makes any performance guarantees of any kind.

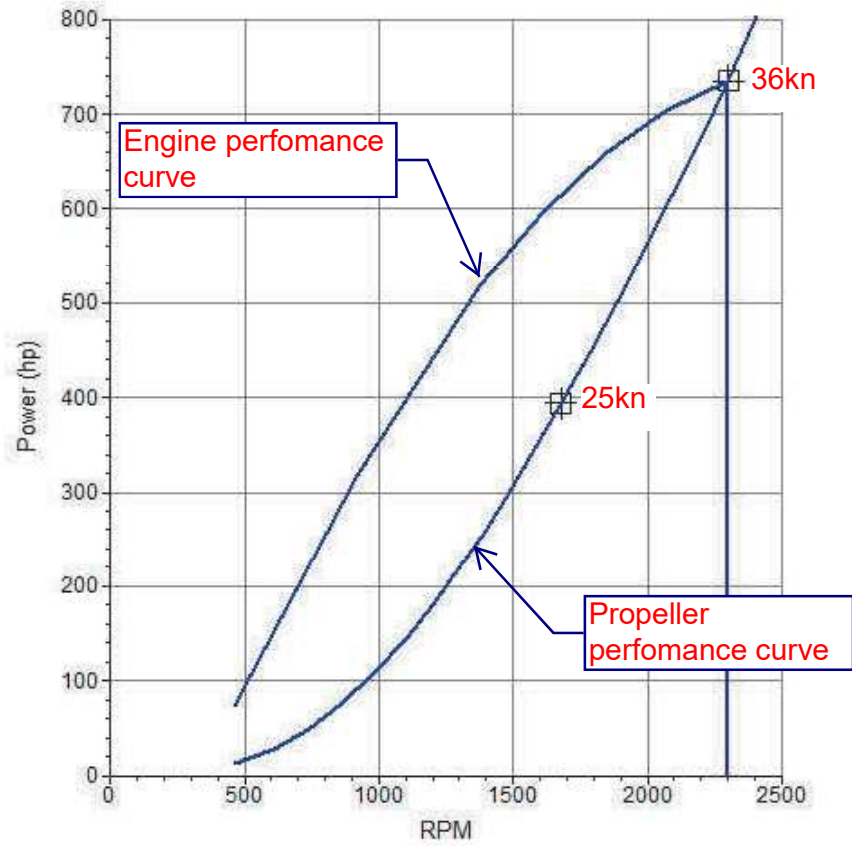
# Engine/propeller Curve

18-mar-2019

Project: **Night Fury - new a four-blade prop**  
Vessel: **Night Fury**



For  
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**28.0 in Diameter 33.3 in Pitch 0.783 Blade area ratio 1.533 Gear ratio**  
Top: **36.0 kts** (2300 RPM/735 hp) Cruise: **25.0 kts** (1678 RPM/394 hp)

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# Technical Appendix

18-map-2019

Project: **Night Fury - new a four-blade prop**  
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## Vessel details [Estimated]

Wake fraction	<b>0.004</b>
Thrust deduction	<b>0.061</b>
Rel-rot efficiency	<b>1.000</b>
Shaft efficiency	<b>0.980</b>

## Speed/power by [Prior trial]

Data confidence	<b>High</b>	Propeller model	<b>Dyna-Jet</b>
Trial speed	<b>30.5 kts</b>	Propeller style	<b>GawnAEW</b>
RPM	<b>2300</b>	Blades	<b>3</b>
Engine model	<b>J&amp;T 8V92TIB</b>	Blade area ratio	<b>0.51</b>
Engine manufacturer	<b>Detroit Diesel (Johnson &amp; Towers)</b>	Diameter	<b>28.0 in</b>
Rated power	<b>735 hp</b>	Pitch	<b>32.0 in</b>
Rated RPM	<b>2300</b>	Cup type	<b>Very Light</b>
Gear ratio	<b>1.533</b>	Cup drop	<b>0.070 in</b>
Predicted vessel drag	<b>7521 lbf</b>	T factor	<b>1</b>
		P factor	<b>1.03</b>

## Engine details [Estimated]

	RPM	Power [hp]	RPM	Power [hp]
1	<b>2301</b>	<b>0</b>	6	<b>1380</b>
2	<b>2300</b>	<b>735</b>	7	<b>920</b>
3	<b>2070</b>	<b>704</b>	8	<b>460</b>
4	<b>1840</b>	<b>657</b>	9	<b>0</b>
5	<b>1610</b>	<b>596</b>	10	<b>0</b>

## Propeller details

T factor	<b>1.000</b>
P factor	<b>1.030</b>
MWR	<b>0.000</b>
BTF	<b>0.000</b>

## Analysis details [Propeller]

Speed [kts]	Cavitating [% of prop]	Pressure [% of criteria]	BAR [% of criteria]	Tip speed [% of criteria]	Propeller efficiency
<b>36.0 (Top)</b>	<b>25</b>	<b>81</b>	<b>100</b>	<b>105</b>	<b>0.712</b>
<b>25.0 (Cruise)</b>	<b>5</b>	<b>62</b>	<b>81</b>	<b>76</b>	<b>0.702</b>
<b>30.5 (Trial)</b>	<b>34</b>	<b>123</b>	<b>154</b>	<b>105</b>	<b>0.582</b>

## Analysis details [System]

Speed [kts]	Propeller RPM	System efficiency	Eng torque [ft-lbf]	Fuel rate [gal/hr]	Slip
<b>36.0 (Top)</b>	<b>1500</b>	<b>0.657</b>	<b>1678</b>	<b>40.0</b>	<b>0.125</b>
<b>25.0 (Cruise)</b>	<b>1095</b>	<b>0.649</b>	<b>1234</b>	<b>21.5</b>	<b>0.167</b>
<b>30.5 (Trial)</b>	<b>1500</b>	<b>0.538</b>	<b>1541</b>	<b>36.7</b>	<b>0.228</b>

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