



Pegasus Steerable Nozzle Trial Report

Date 10-10-03 At De Boarnstream
 About Project steerable nozzle Vessel type Steel motor cruiser yacht
 Weather Temperature: 12° Celsius Wind: 7 Bf Note: Rain and winds
 Held at Water: Princes Margriet channel in Friesland Depth: 5.00 Mtr Flow: Nihil

Ship Type: Boarcruiser 135 steel motor cruiser Name: Bleu Lady
 Size 12 * 3,8 Mtr
 Engine Perkins
 Rating 135 PK * 2600 TPM
 Gearbox Hurth.....
 Reduction 2,03:1

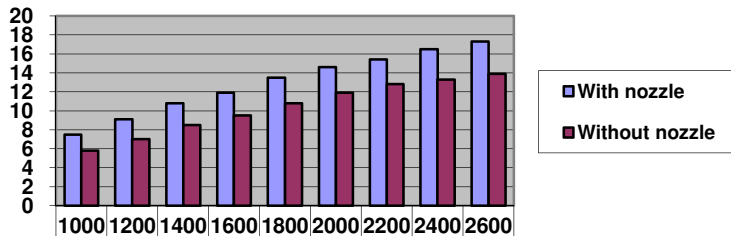
Trials are held with two identical vessels. One with ad one without the Poseidon steerable nozzle

No measurements were taken on torque and fuel consumption. It's assumed that having achieved the maximum RPM of 2600 spot on at max power is giving that torque and consumption is equal.

Discipline With nozzle without nozzle

Propeller Both vessels are having a 22" 4 bladed propeller
 Nozzle type Steerable Poseidon polyurethane nozzle 22"
 Weight of the yacht 9000 Kg 9500 Kg

Speed at 1000 RPM	7,50 Km/h	5,80 Km/h
Speed at 1200 RPM	9,10	7,00
Speed at 1400 RPM	10,80	8,50
Speed at 1600 RPM	11,90	9,50
Speed at 1800 RPM	13,50	10,80
Speed at 2000 RPM	14,60	11,90
Speed at 2200 RPM	15,60	12,80
Speed at 2400 RPM	16,50	13,30
Speed at 2600 RPM	17,30	13,90



	1000	1200	1400	1600	1800	2000	2200	2400	2600
With nozzle	7.5	9.1	10.8	11.9	13.5	14.6	15.4	16.5	17.3
Without nozzle	5.8	7	8.5	9.5	10.8	11.9	12.8	13.3	13.9

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Steerable Nozzle Trial Report

Course: With a nozzle a minimum of corrections are required to keep the yacht on course. Going astern this character is even better as without a nozzle it's almost impossible to stay on course.

Radius at 8 Km/h	SB 20 m with nozzle	SB 20 m without
	BB 16 m with nozzle	BB 20 m without

Radius in astern at 8 Km/h	SB 25 m with nozzle	SB 35 m without
	BB 25 m with nozzle	BB not possible

Sailing in reverse with a nozzle went perfect and the vessel is acting direct. Without a nozzle not.

The radius of 35M was possible but before the yacht even started to turn it went straight for at least 10 mtrs.

Acceleration van 0 tot max. Km/h	15 sec with nozzle	30 sec without
Break way at max. speed tot 0 Km/h	8 sec with nozzle	10 sec without

Notes and conclusions

- Noise and vibration measurements were done by van Cappellen Consultancy. These are given in a separate report. The main results and conclusions are:
 - Noise measurements into the aft compartment taken above the propeller. With a nozzle its approx 3 dB lower. The hull is NOT insulated on the vessel with the nozzle. If compensated an overall advantage of 6 dB is achievable.
 - It's getting better if compared at speed range as a speed of 12 Km/hour is achieved at 1600 rpm with and 2000 without the nozzle. It's obvious that engine noise and vibrations at 1600 RPM are a lot less than at 2000 RPM.
 - Vibration measurements on the hull above the prop are giving a disadvantage for the nozzle in the range of 0 till 125 Hz. (low frequencies) note that the hull here is not isolated. Changing these vibrations into sound it's about 5 dB.
 - When taking vibration measurements at 125 till 2000 Hz it's found that even without the insulation the nozzle gives a much less vibrations. Even that much that transformed into sound it's a reduction of average 15 dB!
- There are existing differences between the vessels. The vessel without the nozzle weights 500 Kg more and the vessel with the nozzle has no carpet, curtains, filled cupboards etc. Also the insulation above the propeller is to be made to come to a fair comparison
- Perkins engines fuel consumption. Without gauges it's not exact but on average the consumption of these engines is about 235 gr/KW/hour.
- Looking at this propeller curve we find that the consumption at cruising speed of 12 KM/Hour is as follows.
 - Consumption at 12 Km/hour with nozzle is about 10 liter per hour.
 - Consumption at 12 Km/hour without nozzle is about 13 liter per hour.
- So with a nozzle a saving of 30% at cruising speed is realized
- With a nozzle the maximum speed is 3,5 Km/Hour more. This is a 25 % improvement.
- The vessel with a nozzle is making a lot less waves. The propeller water stream behind the yacht is even straight flat.

Note: Above report is preliminary and will be corrected after a second measurement when the differences are leveled out. Please also don't make a direct comparison with other vessels. The construction of the yacht, materials used, resistance curves, engines installed etc all make differences. In general it's obvious that the usage of a Poseidon steerable nozzle gives advantages in

- Fuel consumption
- Noise and Vibration reduction
- Steering improvement
- Speed increase

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