



HamiltonJet

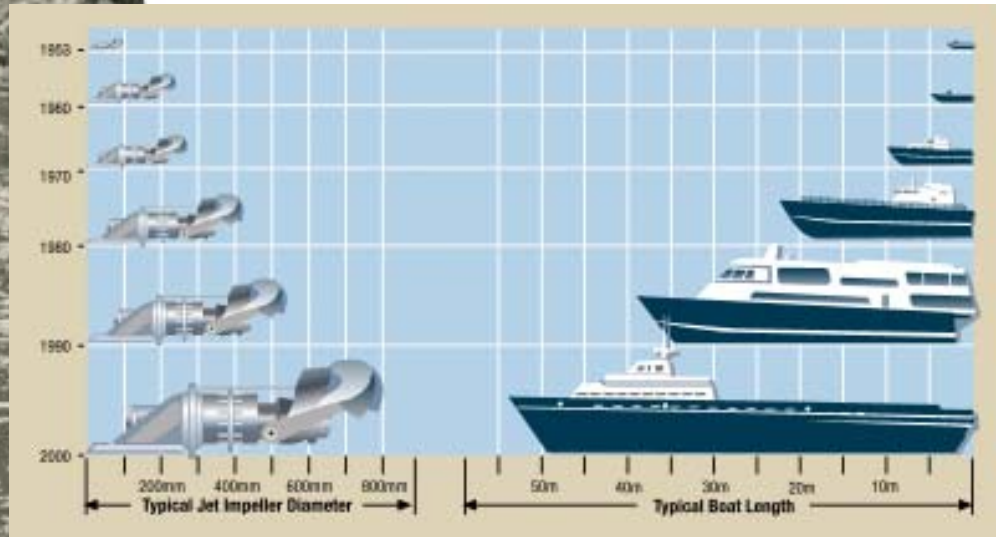
HJ Series Waterjets



Evolution

In 1954 the first Hamilton Waterjet successfully propelled a small boat against the current of a swift-flowing river. Since then HamiltonJet's product range has been refined and expanded, firmly establishing the Company as a leader in the marine propulsion industry. With more than 35,000 installations over 50 years, HamiltonJet has a world of experience.

1956 Chinook, the first Hamilton model in axial flow configuration.



HamiltonJet HJ Series

The HamiltonJet HJ Series of waterjets have evolved to represent the latest technological advances in marine propulsion. As boat speeds rise above 25 knots, Hamilton waterjets return higher propulsive coefficients than conventional propellers. They are therefore an ideal choice for high-speed workboats, patrol craft, fast ferries and recreational pleasure cruisers.

HamiltonJet innovation is the result of on-going research and development utilising its on-site hydrodynamic test rig facility and test boat programmes. Close co-operation is maintained with the local university throughout these programmes.

The HamiltonJet factory is dedicated solely to the production of waterjets. All components are manufactured using the latest CNC machinery, and are produced to the world's most stringent marine quality standards, including ABS, Lloyds and Det Norske Veritas.



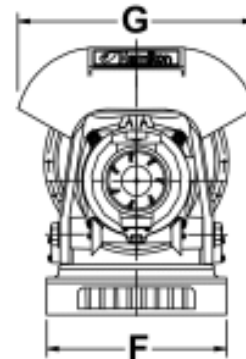
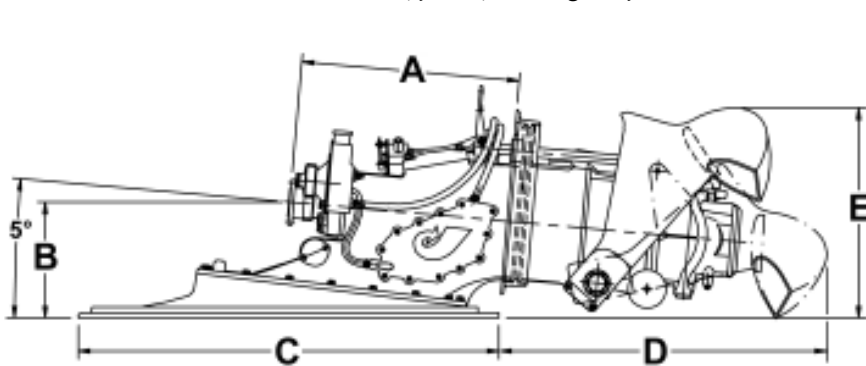
Cover photos:
Nassau County Police Patrol Boat, USA. Twin HJ322 waterjets
"Humber Callisto" – Pilot Tender, UK. Triple HJ362 waterjets

Model Range



Dimensions & Power/RPM Inputs

The HJ Series comprises a range of highly efficient waterjet units suitable for propelling craft at speeds ranging from zero to over 50 knots and typically of length up to 20 metres.



Layout and dimensions shown are indicative only for initial design purposes, based on jets with standard 5° intake block which facilitates close direct drive coupling of the engine. An optional 0° intake block, which positions the jet parallel to the hull bottom for reduced engine installation height when using a drop centre gearbox, is available for certain models.

Consult HamiltonJet for more detailed information.

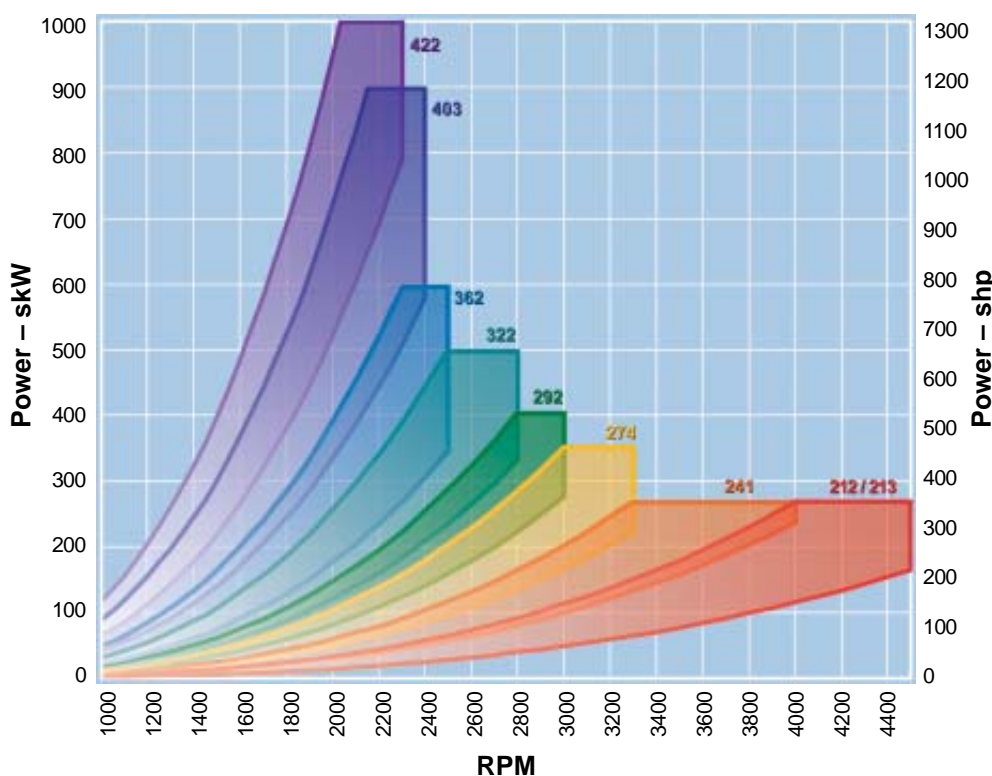
Jet Model	A (mm)	B (mm)	C (mm)	D (mm)	E (mm)	F (mm)	G (mm)	Dry Weight (kg)	Maximum Power (kW / hp)	RPM (Maximum)
HJ212	450.3 ^a	221.2	762	732	440	386	450	77	260 / 350	3950- 4500
HJ213	413	249	762	720	420	386	450	89	260 / 350	3950-4500
HJ241	424	284	829	824	491	431	502	132	260 / 350	3250-4000
HJ274	570	302	1100	840	548	608	470	164	330 / 440	2930-3300
HJ292	681	330	1180	862	550	495	608	208	400 / 540	2850-3000
HJ322	866	371	1380	980	637	550	680	326	500 / 670	2550-2800
HJ362	1025 ^b	406 ^b	1565	823	774	550	790	426	600 / 800	2300-2500
HJ403	1053	474	1723	1230	752	690	803	695	900 / 1200	2240-2400
HJ422	1380	484	2082	1090	940	960	964	785	1000 / 1340	2020-2300

NOTES: ^a – HJ212 “A” dimension is to the end of a splined shaft. May be close coupled.

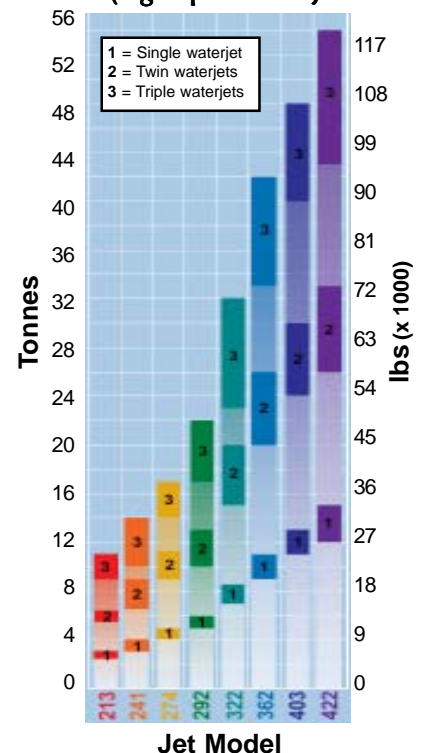
^b – HJ362 “A” and “B” dimensions shown are average only. Exact dimensions depend on driveshaft/coupling flange option chosen.

Input RPM are subject to suitable cavitation limits – lower RPM figure is always preferred. Higher power inputs will restrict input RPM range.

HJ Series Power/RPM Envelopes



Maximum Recommended Displacement (high speed craft)

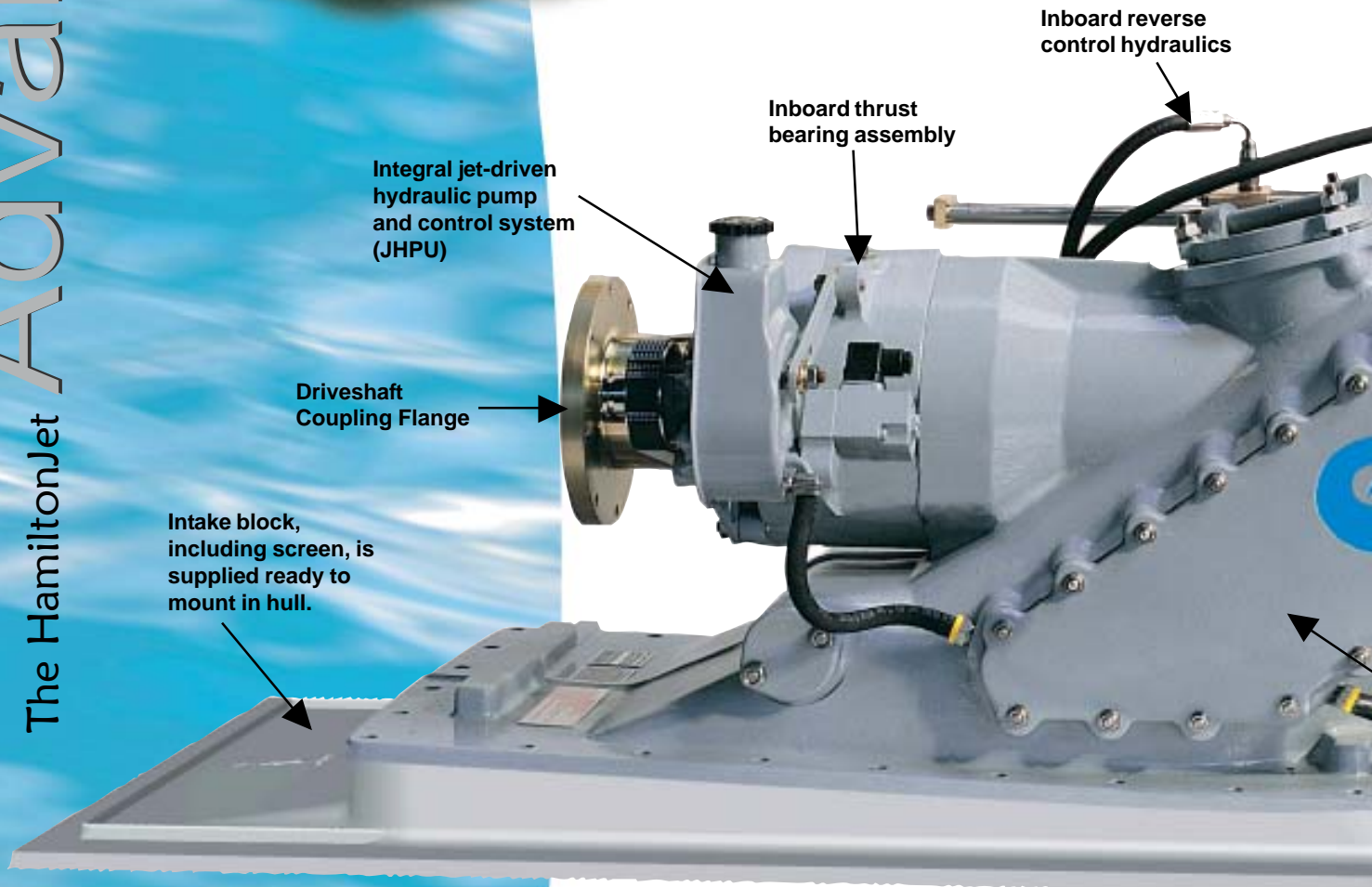


The HamiltonJet Advantage

Halmatic "Pacific 22 MKII" Navy Support RIB, UK. Single HJ241 waterjet

Complete Integrated Design

- Each Hamilton Waterjet is a complete packaged, factory tested, propulsion module.
- Reverse and Steering control systems are fully integrated with the jet to simplify installation and maintenance.
- No difficult engine alignment problems, and the jet can be direct-driven or connected via a gearbox.



Integral jet-driven hydraulic pump and control system (JHPU)

Inboard thrust bearing assembly

Inboard reverse control hydraulics

Driveshaft Coupling Flange

Intake block, including screen, is supplied ready to mount in hull.

Safety & Comfort

- No exposed propeller means complete safety around marine wildlife and people in the water.
- No hull vibration, no torque effect and no high speed cavitation gives maximum comfort levels.
- Low underwater acoustic signature.

Low Maintenance

- Absence of exposed propulsion gear reduces risk of impact damage.
- Impeller is finely matched to engine power to eliminate engine overload under any conditions.
- Integral corrosion and wear protection allow for simple maintenance routines – minimise downtime and maximise profits.

Proven Practicality

- All Hamilton Waterjets include an intake protection screen designed to have no effect on the waterjet performance.
- Waterjet intake flush with hull bottom to allow minimum draught, while the absence of underwater appendages significantly reduces hull resistance.



"Condor Express" – Tourist Ferry, USA. Quadruple HJ362 waterjets

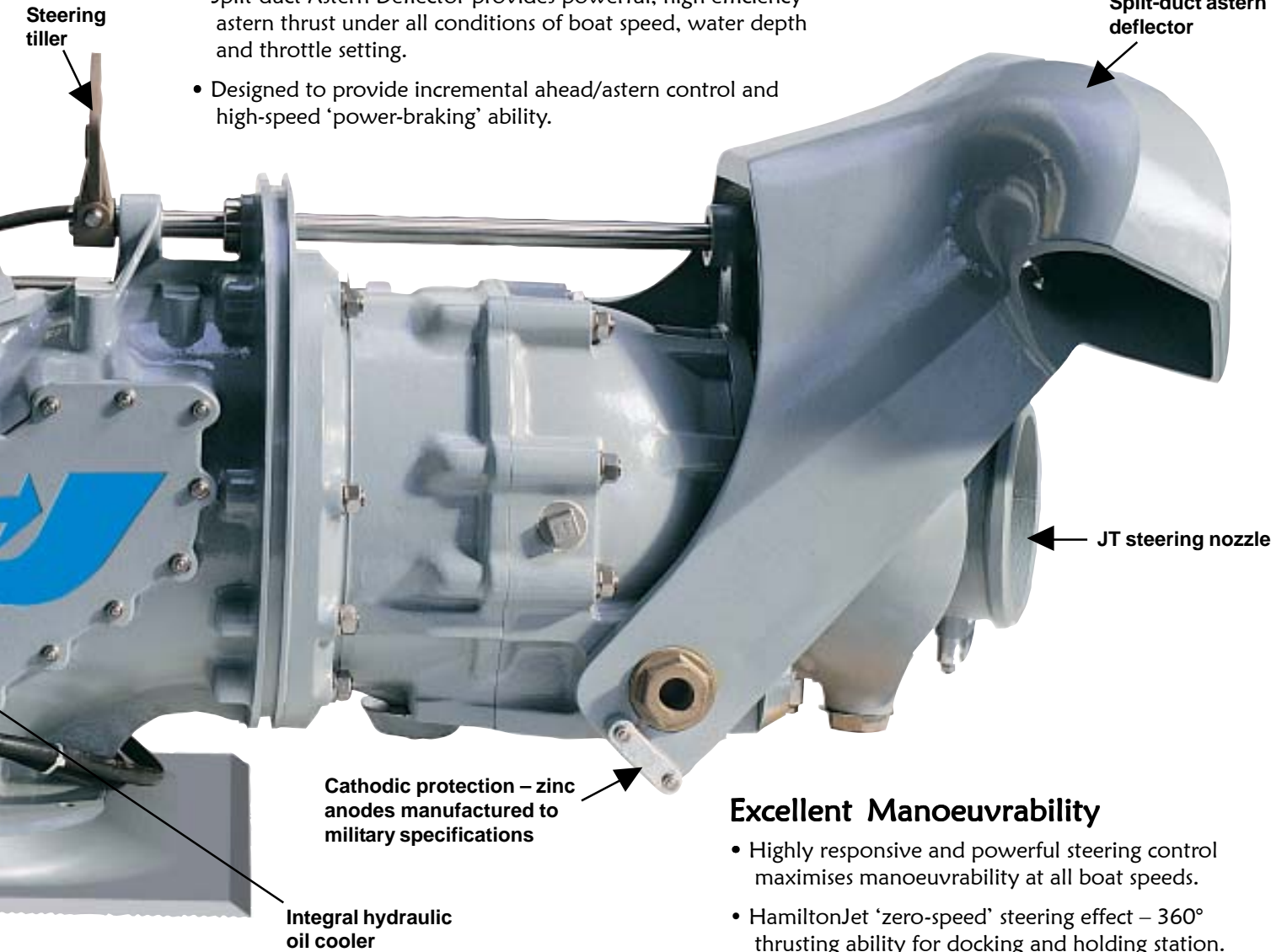


International Design Standards

- All Hamilton Waterjets are designed and manufactured to meet the requirements of the world's leading certifying authorities.
- Materials renowned for strength and resistance to corrosion are used extensively, together with an integral cathodic protection system.

Maximum Astern Thrust

- Split-duct Astern Deflector provides powerful, high efficiency astern thrust under all conditions of boat speed, water depth and throttle setting.
- Designed to provide incremental ahead/astern control and high-speed 'power-braking' ability.



Excellent Manoeuvrability

- Highly responsive and powerful steering control maximises manoeuvrability at all boat speeds.
- HamiltonJet 'zero-speed' steering effect – 360° thrusting ability for docking and holding station.

Efficiency & Flexibility

- HamiltonJet's mixed-flow impeller design gives very high propulsive coefficients with outstanding resistance to cavitation.
- Waterjets are suitable for both planing and displacement speed craft, single or multi-jet installations with no loss of efficiency. Can also be used with other propulsors or other size waterjets for loiter or boost propulsion.
- Large HamiltonJet model range enables the most effective propulsion option to be selected for all applications. Computerised selection – taking into account factors such as hull resistance, speed, power input, fuel load and lifetime propulsion costs – is available.

KNRM "Valentijn" Class Rescue Vessel, The Netherlands. Twin HJ292 waterjets



Operation



"Talaria" – 40' Pleasure Cruiser, USA.
Twin HJ322 waterjets

Control Functions

Since the steering and ahead/astern functions are separate and have independent effects, they may be used in conjunction with each other to enable complex vessel manoeuvres without complex combinations of control inputs by the operator.

With the astern deflector fully raised, full forward thrust is available. With the deflector in the lower position, full astern thrust is generated. In both positions full independent steering is available for rotating the craft. By setting the deflector in the intermediate "zero-speed" position, ahead and astern thrusts are equalised for holding the craft on station, but with independent steering effect still available for rotational control. Infinitely variable adjustment either side of "zero-speed" enables the craft to be crept ahead or astern, and in multiple jet installations, appropriate thrust vectoring alone can be used to induce true sideways movement.

TOTAL 360° CONTROL

JT Steering

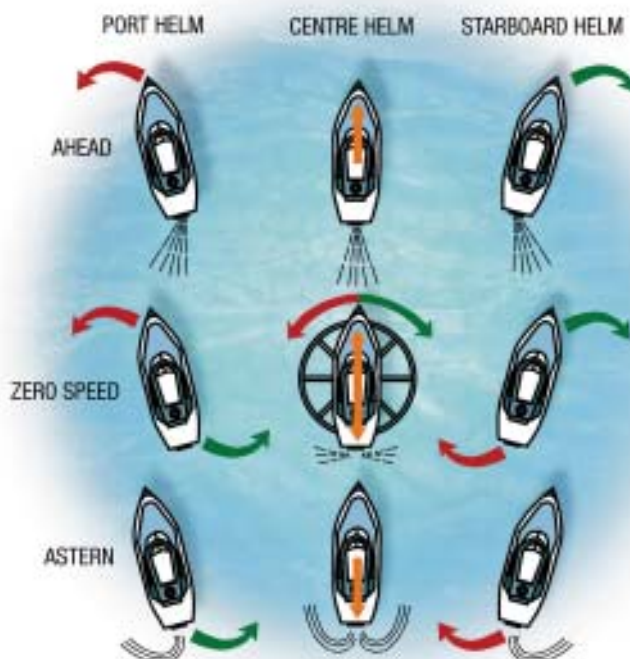
All HJ Series waterjets incorporate HamiltonJet's JT steering nozzle to optimise both steering efficiency and delivery of propulsive thrust. Compared with other waterjet steering systems, the JT nozzle provides outstanding steering response at all boat speeds. This is particularly noticeable at low speeds due to the absence of a central "deadband". The design reduces nozzle flow disturbance, resulting in lower energy losses and minimal loss of forward thrust when steering. These factors mean higher overall efficiency through improved course-keeping and, coupled with low steering loads and noise level, make the JT system highly effective and reliable under all conditions.

Ahead / Astern

As with steering, the ahead/astern function is an integral part of the HJ Series waterjet. The split-duct astern deflector is designed to provide maximum astern thrust under all conditions of boat speed, water depth and throttle opening. The splitter incorporated in the deflector divides the flow to two outlet ducts. These ducts angle the astern jetstream down to clear the transom and to the sides to retain the steering thrust component. Vectoring the astern thrust away from the jet intake avoids recycling and the resulting astern thrust is equivalent to up to 60% of ahead thrust – maintainable up to high throttle settings.

The shift from full ahead to full astern is a smooth transition as the deflector is lowered through the jetstream, eliminating any delay or shock loading normally associated with propeller/gearbox drives. Designed to withstand the loads imposed when the deflector is lowered at full speed ahead, the arrangement provides a powerful braking function for emergencies.

The separation of the steering and ahead/astern functions offer the opportunity for unlimited combinations of transitional and rotational movements for outstanding vessel control.



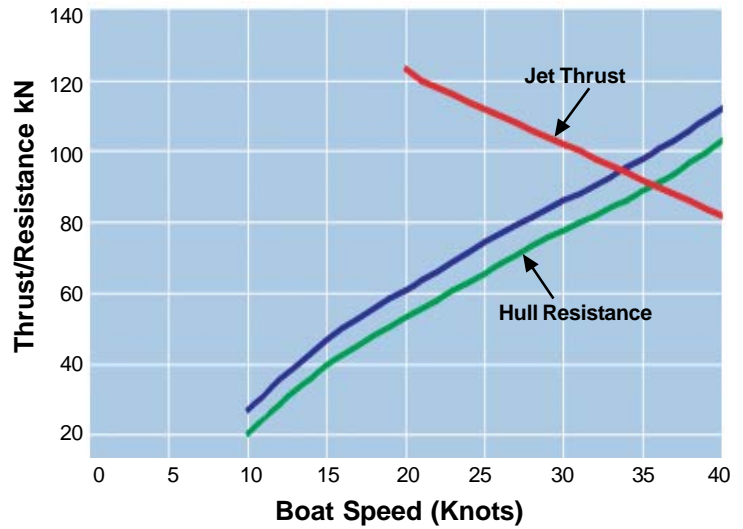
Application Engineering



HamiltonJet's extensive experience means a wealth of expertise is available to designers, builders and operators. From conceptual design stages to final commissioning, computer speed predictions and nozzle optimisation studies, service life costs, detailed installation advice, commissioning assistance and training programmes are available to support each project.

Typical Speed Estimate

Hull resistance is provided by the designer or can be estimated by HamiltonJet using vessel data such as waterline length, chine beam, deadrise angles, LCG (if known), fully laden displacement and light displacement, and proposed engine power/rpm data (see Application Questionnaire form included).



From Conceptual Design to Final Commissioning:
Halmatic Cougar Enforcer 33 Patrol Boat.
Twin HJ274 waterjets



Application Reviews

HamiltonJet publishes "JetBrief" Application Reviews to highlight the proven benefits of waterjets on a wide variety of vessels currently in operation. Contact your local HamiltonJet Distributor for copies of these Application Reviews.



Lambro "Magna 110" – Crewboat RIB, Greece. Twin HJ241 waterjets

This Questionnaire is for checking that intended hull shape and speed are suitable for waterjets and to initially select the best propulsion option. Note that the more information supplied, the greater the accuracy with which an appropriate propulsion system can be selected.

All information supplied will be treated as strictly confidential.

Project References

Company: _____ **Contact Name:** _____

Tel. No. _____ **Fax No.** _____ **Email:** _____

Project Reference. _____

Hull Description

Hull Construction Material: Aluminium Wood GRP Steel Other _____

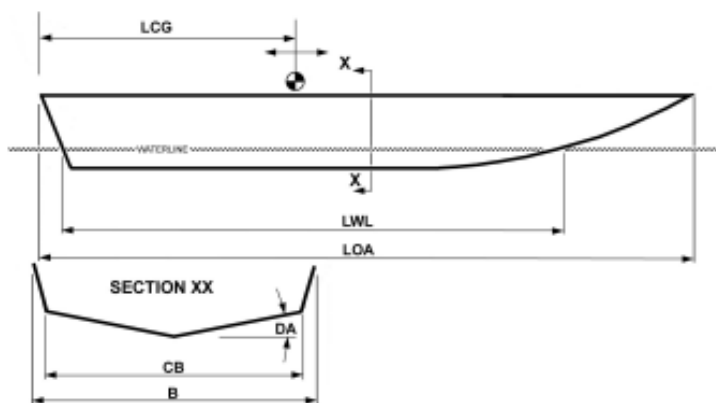
Hull Form: Monohedron Monohull Warped Monohull Catamaran Other _____

Planing Semi-Displacement Displacement Barge/Landing Craft

Hard Chine Round Bilge

Note any other distinguishing hull bottom features or appendages (eg: lifting foils, planing strakes): _____

Key Hull Dimensions (please specify unit of measure)



LOA = Overall Length: _____

LWL = Waterline Length: _____

LCG = Longitudinal Centre of Gravity: _____

B = Beam Overall: _____

CB = Chine Beam: Max. _____ at transom. _____

DA = Deadrise Angle: mid LWL. _____ Transom. _____

Height = above WL: _____ (wind resistance allowance)

Displacement: Maximum: _____

Light: _____

Trials (if available): _____

Expected Design Performance

Vessel Speed with Maximum Power Input:

at Maximum Displacement = _____

at Trials Displacement = _____

at Light Displacement = _____

Seastate _____

Vessel Speed with Continuous Power Input:

at Maximum Displacement = _____

at Trials Displacement = _____

at Light Displacement = _____

Seastate _____

Attach Hull Resistance Data (if available): Estimated Model Tested incl. allowances for: Wind Waves

Proposed Engine(s)

Single **Twin** **Triple** **Quad** **Make:** _____ **Model:** _____

Power: Maximum = _____ kW (_____ hp) at _____ rpm

Continuous = _____ kW (_____ hp) at _____ rpm

above ratings are: Nett Flywheel Power or Nett Shaft Power

Gearbox: No Yes Gearbox Ratio: _____

Complete this form, then return to your local HamiltonJet Distributor or Regional Office by facsimile or post. See back page of this brochure for contact details.

This questionnaire is also available in electronic/email format from www.hamiltonjet.co.nz.

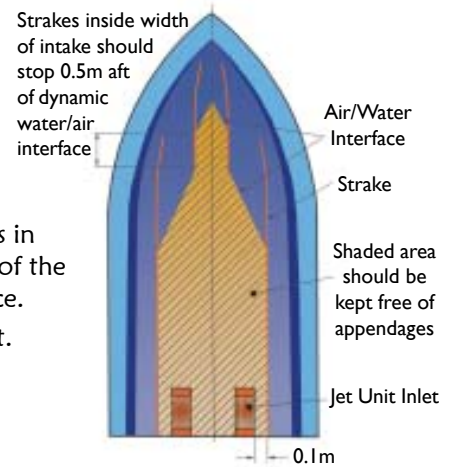
Suitable Hull Forms

This page provides basic information to assist when determining the suitability of waterjet propulsion for different hull forms, vessel applications and performance expectations.

General Guidelines

The hull shape, **monohull or multihull**, should be that which best suits the size, displacement and cruising speed of the craft, but with the following prerequisites:

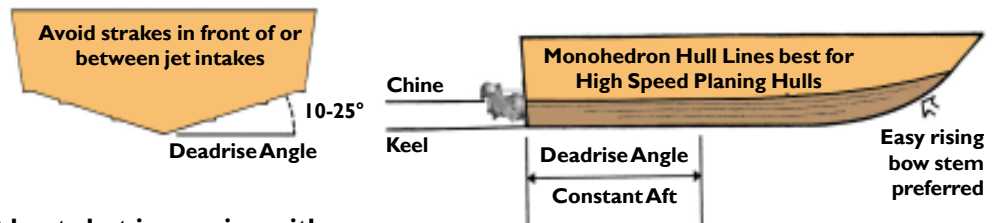
- hull shape and appendages must avoid entraining air into the waterjet inlet.
- if no keeling is proposed, hull shape must be directionally stable without such appendages.
- avoid appendages such as keels, rudders, planing strakes, etc for at least 2 metres in front of the waterjet intake. Appendages can generally be placed to the outside of the projected area forward of the waterjet inlet(s) without affecting their performance.
- water level must be at least up to the waterjet mainshaft when the craft is at rest.
- **HamiltonJet should be consulted in all cases before construction starts.**



High (“Planing”) Speed Craft (over 30 knots)

For best directional stability and speed, a hull with monohedron lines (constant deadrise over planing area) is recommended.

Avoid deep and fine bow stems as, without additional keeling, these can cause directional instability at speeds over 25 knots. Also for directional stability and to avoid air being entrained into the waterjet from bow waves, deadrise angles of between 10° and 25° are generally recommended.



Medium Speed Craft (10 to 30 knots but increasing with length)

Low trim angles, particularly in conjunction with slender hulls of high length to beam ratio are best suited.

- **Semi-Displacement Hulls** are suitable provided there is sufficient immersion for the waterjet(s) to prime when the craft is at rest. For best speed, maintain LCG well forward, especially with round bilge hulls.
- **Catamarans**, of both semi-planing and semi-displacement types, can perform well in this speed range provided they obtain low running trim angles.
- **Warped Hulls** with reducing deadrise angles going aft can reduce trim angles and thus hull resistance in the semi-planing speed range, improving load carrying ability.
- **Keeling** – due to moderate dead rise and immersion aft and deeper vee forward sections, some keeling aft may be required to maintain directional stability.

Slow Speed Craft (0 to 10 knots but increasing with length)

Craft speed is limited by the Water Line Length (LWL) and efficient hull shape rather than shaft power.

At speeds up to Natural Displacement Speed (NDS), very modest shaft power is required and acceptable propulsive efficiencies can thus be obtained with relatively small waterjets.

Multihulls

Long narrow multihulls, which maintain low trim angles throughout the whole speed range, are well suited to waterjet propulsion. To minimise hull resistance of catamarans, designers should compensate for the lost buoyancy aft caused by the installation of the waterjets, generally by keeping the Longitudinal Centre of Gravity (LCG) well forward.

SES concept hulls and foils can provide additional ‘lift’ to the hull and give significant reduction in resistance, but care must then be taken to avoid aerated water from the bows and foils entering the waterjet(s).

In all situations we recommend you submit the Application Questionnaire form on the reverse and then discuss your propulsion options with a HamiltonJet authorised Distributor to ensure waterjets are successful in your vessel.



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