

Hamilton Jet  
Application Review

## Hamilton Waterjets Ideal Choice for High Speed Pilot Boats

*"A modern fleet of ships does not so much make use of the sea as exploit a highway."*

**Joseph Conrad (1906)**

As ships get faster and shipping lanes busier, Pilot Associations around the world are finding they need a new type of vessel to keep up. Today's hard working pilot boats must be fast, highly manoeuvrable, efficient and reliable, safe in all situations and able to carry a large number of pilots. These specific requirements make Hamilton Waterjets the preferred propulsion choice for many new pilot boats operating in the busiest harbours around the world.



**Puget Sound Pilot Boat (Washington State, USA)**

In demanding pilot transfer conditions, Hamilton Waterjets offer a range of benefits other forms of propulsion do not. Features of Hamilton Jets include...

### Manoeuvrability & Control

Hamilton Waterjets provide pilot boats with fast acceleration and outstanding control, important factors when operating alongside a ship during pilot transfer.

Independent steering and reverse deflectors provide full directional control at all boat speeds including 'zero-speed', which allows 360° 'on-the-spot' rotation and, with multiple waterjets, sideways movement. In particular,

rotational and sideways control can be maintained at any forward speed, which gives unparalleled positioning control alongside a ship and allows Pilot transfers at vessel speeds in excess of 20 knots.

### Constant Direction of Rotation

Because no reversal in shaft direction is required when transferring from ahead to astern, forceful manoeuvres at relatively high throttle openings can be undertaken without causing high stresses to the driveline.

This results in extended periods between overhauls and longer life overall for engine, gearbox and driveline.

### Safety

No exposed rudders or propellers make it safer for people in the water and reduce the risk of the boat heeling dangerously when sucked in beside a large ship.

### Smooth & Quiet

Waterjets are free of vibration and very quiet, giving a smooth and comfortable ride to crews and pilots. This assists any communications and greatly reduces fatigue.



**Dutch Pilot Boat "Discovery"**

# Advanced Humber Pilot First With Triple Hamilton Waterjets



**Name:** "Humber Callisto"  
**Waterjets:** Triple Hamilton Jet Model HJ362  
**Location:** United Kingdom



**"Humber Callisto", the latest pilot in the Associated British Ports (ABP) Hull fleet, is at the forefront of pilot boat technology. From the designer of the 20m Discovery class vessels operated by the Dutch Pilot Association, the 17 metre Humber Callisto is the first pilot boat to employ triple Hamilton Waterjets (HJ362s) and the first in the UK with an advanced double chine hull.**

ABP Hull spent over three years researching the Humber Callisto project. The double chine hull form was chosen following extensive research and model testing, along with inspection of larger Camarc designed pilot boats in The Netherlands which are based on the same hull concept.

The double chine hull system has a number of sea-keeping advantages, and according to the designers is well suited to waterjet propulsion.

Triple waterjets were proposed for the Humber Callisto so that the vessel would still be operational should one engine be temporarily out of service, and to provide greater flexibility when it comes to operating speeds and fuel consumption. During trials, Humber Callisto proved her ability in this regard, achieving 25 knots with just two of her three engines running.

The Humber Callisto's GRP hull is constructed to approval of Lloyd's Special Service Craft Rules for structure and to the MCA Workboat Code of Practice as a pilot boat. Comfort levels for two crew and up to ten pilots has been improved with significant noise and vibration reduction measures. Noise levels inside the wheelhouse are kept below 75dBA.

The high level of control required when boarding pilots onto moving ships was a major factor in the choice of Waterjet propulsion. The vessel operates in the busy

Humber Estuary where each year pilots board over 25,000 ships bound for the ports of Hull, Goole, Grimsby and Immingham.



ABP Pilot Boat "Humber Callisto" ▲

Columbia Bar Pilot Boat "Chinook" ▼



"Chinook" during rollover tests ▼



## Brief Specifications

**NAME:**  
Humber Callisto  
**LENGTH:**  
17.2 metres [LOA]  
**BEAM:**  
4.6 metres  
**DRAUGHT:**  
0.8 metres  
**CONSTRUCTION:**  
GRP  
**DISPLACEMENT:**  
24 tonnes  
**SPEED:**  
35 knots (full load)  
32 knots (cruise)  
**WATERJETS:**  
Triple Hamilton Jet Model 362  
**WATERJET CONTROLS:**  
Hamilton Jet Type HSRC  
**ENGINES:**  
Triple Scania DI 14, each  
447kW (600hp) @ 2100rpm  
**DESIGNER:**  
Camarc Ltd, Worthing, UK  
**BUILDER:**  
Souter Marine, Isle of Wight, UK  
**OPERATOR:**  
Associated British Ports, Hull, UK  
**Hamilton Jet DISTRIBUTOR:**  
Hamilton Jet (UK) Ltd  
East Grinstead, UK



**Name:** "Puget Sound"  
**Waterjets:** Twin Hamilton Jet Model HM571  
**Location:** Washington State, USA



The latest pilot boat for the 54-member Puget Sound Pilots Association (PSPA) is the culmination of six years of development and represents further steps forward in terms of design, propulsion and overall capabilities of a modern pilot boat.

From day one the design team for the "Puget Sound" set specific parameters and criteria, then developed the boat around these standards. Main objectives were a boat that could operate in all conditions and under a high workload, was strong and agile, and was safe and comfortable for the pilots.

Waterjets were seen as the best propulsion option, with twin Hamilton HM571 jets providing outstanding manoeuvrability, low maintenance and repair costs,

plus overall efficiency and safety. PSPA committee co-chair John Harris says it was a quick decision to choose waterjets over propellers once they had seen the Dutch pilot boats in action. "For pilot transfer purposes, waterjets are a fantastic choice", he says.

The GRP hull was designed with a number of anti-pitch, anti-roll and anti-heeling features. These features, along with the low drag and manoeuvrability afforded by the waterjets, allow the new vessel to operate safely at higher speeds and at a greater angle to a ship.

## Brief Specifications

**OPERATOR:**  
Puget Sound Pilots Association  
**LENGTH:** 22.5 metres (LWL) **BEAM:** 6.0 metres  
**CONSTRUCTION:**  
Foam-cored GRP  
**SPEED:**  
27 knots  
**WATERJETS:**  
Twin Hamilton Jet Model 571  
**WATERJET CONTROLS:**  
Hamilton Jet Type HYRC  
**ENGINES:**  
Twin Caterpillar diesels model 3412, 780kW (1,050hp) @ 2300 rpm  
**DESIGNERS:**  
Tim Nolan Marine Design, Port Townsend WA, & Hagemarine, Seattle WA, USA  
**BUILDER:**  
Nordlund Boat Co, Tacoma WA, USA  
**Hamilton Jet DISTRIBUTOR:**  
Hamilton Jet Inc, Seattle WA, USA

## Brief Specifications

**OPERATOR:**  
Columbia River Bar Pilot Association, Oregon, USA  
**LENGTH:** 22.0 metres **BEAM:** 6.4 metres  
**CONSTRUCTION:**  
Aluminium  
**DISPLACEMENT:**  
46.2 tonnes  
**SPEED:**  
30 knots (25 knots cruise)  
**WATERJETS:**  
Twin Hamilton Jet Model 651  
**WATERJET CONTROLS:**  
Hamilton Jet Type MECS  
**ENGINES:**  
Twin DDC/MTU 16V 2000 diesels 960kW (1285hp) @ 2100rpm  
**DESIGNER:**  
Camarc Ltd, Worthing, UK  
**BUILDER:**  
Kvichak Marine Industries, Seattle WA, USA  
**Hamilton Jet DISTRIBUTOR:**  
Hamilton Jet Inc, Seattle WA, USA

**Name:** "Chinook"  
**Waterjets:** Twin Hamilton Jet Model HM651  
**Location:** Washington State, USA



A special pilot boat is needed to operate in the extreme weather and turbulent sea conditions of the Columbia River Bar. Features integrated into the Camarc designed and Hamilton Jet powered Columbia Bar pilot boat "Chinook" improve its overall safety and operational abilities.

Twin Hamilton Jet model HM651 waterjets and Detroit diesels provide "Chinook" with the power, speed, safety and manoeuvrability required in this modern pilot boat.

Chinook's hull, designed by Camarc and based on the very successful Dutch pilot boats, has significant structural reinforcement and an advanced foam fendering system to go with its double chine hull shape.

Another important design feature of Chinook is its self-righting ability, allowing the vessel to survive a 360° rollover and return

safely with all crew and equipment intact.

Carrying two crew and four pilots, Chinook has a range of 250 nautical miles at an operational speed of 25 knots. The vessel's bridge console has mirrored control stations to both port and starboard, which improves operator visibility and control for close manoeuvring and in difficult sea conditions.

The Columbia Bar pilot boat works in tandem with a helicopter, and will generally take over pilot-delivery duties when the helicopter is unable to operate.

# 10 Dutch Pilot Boats Powered by Hamilton HM571 Waterjets



**Name:** "M.V. Discovery"  
**Waterjets:** Twin Hamilton Jet Model HM571  
**Location:** The Netherlands

Loodswezen, the Dutch Pilotage Organisation, is committed to waterjet propulsion, highlighted by its use of twin Hamilton HM571 waterjets in all 10 of its modern pilot boats. Following evaluation of the prototype 'new generation' 18.5 metre pilot "Voyager" in 1993, the Authority has since commissioned a further nine 21 metre high speed/high tech pilot boats to give it the most modern fleet in the world.

The Dutch pilot boats' revolutionary features, including use of waterjet propulsion, are often used as the benchmark for new pilot boat projects around the world. Their success has helped demonstrate the many advantages waterjets have over propellers in all pilot transfer situations.

All the Dutch pilot boats are powered by 980hp Deutz MWM engines and Hamilton HM571 waterjets. This combination, together with the double chined aluminium hull, give the vessels a top speed of over 30 knots and allow the pilot service to operate up to 30 miles offshore. The hull design and waterjets also give excellent manoeuvrability and safety when operating at slower speeds alongside ships.

These pilot boats often operate in very

rough sea conditions with swells up to 2.7m and strong winds. Sea temperature is below 13°C for much of the year and one of the main reasons waterjets were chosen was the safety and speed of recovery in the event of a pilot overboard. In rough conditions the new pilot boats can maintain a speed of 19 knots, 10 knots faster than the older propeller driven vessels in similar conditions.

Loodswezen operates out of eight locations around The Netherlands, with about 550 pilots making over 100,000 boardings in a year. Each waterjet powered pilot boat is putting in more than 3,000 hours per annum, working in tandem with three 60m Pilot Cutters, several 7m pilot daughter boats, a training vessel and seven propeller driven 23m pilot boats. A helicopter is also used out of Rotterdam and Amsterdam.

All 10 waterjet powered vessels in the pilot fleet can carry 12 pilots and three crew. They are certified to ABS standards for pilot boats and to Netherlands Shipping Inspectorate standards.



The original Dutch pilot prototype "Voyager"

## ▶ Brief Specifications

- OPERATOR:**  
Loodswezen – Dutch Pilotage Org.
- LENGTH:**  
20.95 metres (LOA)
- BEAM:**  
5.5 metres
- DRAUGHT:**  
1.0 metres (static)
- CONSTRUCTION:**  
Aluminium
- DISPLACEMENT:**  
33.0 tonnes
- SPEED:**  
28 knots (operational)
- WATERJETS:**  
Twin Hamilton Jet Model HM571
- WATERJET CONTROLS:**  
Hamilton Jet Electronic
- ENGINES:**  
Twin Deutz MWM TBD616V12, diesels, 720kW (980hp) @ 2100rpm
- GEARBOXES:**  
ZF Model BU 250
- DESIGNER:**  
Camarc Ltd, Worthing, UK
- BUILDER:**  
Engelaer Scheepsbouw b.v., Leeuwen, The Netherlands
- Hamilton Jet DISTRIBUTOR:**  
AMW Marine, H.I. Ambacht, The Netherlands
- REFERENCES:**  
Jet Briefs 242 & 285