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Service: Catamaran Passenger Ferry
Location: Canada

Hamilton Jet Model HM811
Application Review

Hamilton's Biggest for Passenger Ferry, Famille Dufour II

A twin shipset of the largest waterjets in Hamilton Jet's extensive range have successfully been installed in a 40 metre catamaran passenger ferry built in Canada. The two jets, driven by Caterpillar diesel engines, produce sufficient thrust to push the 300 passenger vessel to speeds of 30 knots as it transports guests between the various hotels in the Famille Dufour chain spread along the St. Lawrence River and undertakes whale watch excursions.

Brief Specifications

NAME:
MV Famille Dufour II
SERVICE:
Passenger Ferry
LENGTH:
40.00 metres [LOA]
34.20 metres [LWL]
BEAM:
10.50 metres
DRAUGHT:
1.37 metres [static]
CONSTRUCTION:
Aluminium
DISPLACEMENT:
160 tonnes [maximum]
130 tonnes [lightship]
PAYLOAD:
300 passengers
CERTIFICATION:
C.S.I (vessel)
A.B.S (waterjets)
SPEED:
30 knots

WATERJETS:
Twin Hamilton Jet Model HM811
WATERJET CONTROLS:
Hamilton Jet Electronic
ENGINES:
Twin Caterpillar V16 diesels
Model 3516B DI-SWAC, each
1640kW (2200bhp) @ 1800rpm
GEARBOXES:
Twin ZF model BW 750
reduction/reversing type
DRIVELINES:
GWB 390-65
DESIGNER:
Rejean Desgagnes Concept
Naval Inc., Quebec, Canada
BUILDER:
La Goelette Marie-Clarisse Inc,
Quebec, Canada
OPERATOR:
Famille Dufour Cruises,
Quebec, Canada

Supplied as a total package complete with control systems so as to easily integrate with the vessel structure, the HM811 jet propulsion package has met all expectations in terms of performance, efficiency, cavitation resistance and manoeuvring capability.

TECHNICIANS APPLY FINISHING TOUCHES TO THE TWO HM811 JETS PRIOR TO DISPATCH FROM THE HAMILTON JET FACTORY

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EASY INSTALLATION

The packaged nature of the Hamilton Jet design ensured a quick and easy installation process. The matching intake/transition ducts were supplied to the yard at the early stages of hull construction, minimising any delays to the production schedule. The intake/transition was simply welded to the hull bottom during construction and the Hamilton Jet design is such that all propulsion thrust loads are transferred this to the hull bottom, eliminating any need for special strengthening of the transom.

The jets were simply bolted to their transitions during the machinery installation phase, the drive – lines connected and the control systems interfaced. An integral hydraulic power system on the HM811 jets, including jet driven hydraulic pump, made the latter a simple procedure.

THE 40 METRE CATAMARAN READY FOR LAUNCH DAY

CONTROL SYSTEMS

The control system in *Famille Dufour II* for affecting thrust control, steering and ahead/astern functions is a Hamilton Jet microprocessor based electronic network. Of single station configuration, the system comprises…

- **Single Lever Throttle and Reverse,** *interfaced with the engine controls and providing proportional follow-up control of the jets astern deflectors and engine throttle.*
- **Steering** *using proportional joystick.*
- **Gearbox** *control by push button panel with high rpm interlock and neutral safety start.*
- **Position Indicators** *for steering and astern.*
- **Emergency** *steering and astern jogstick.*

The system permits simple vessel control without the complexity of the likes of differential steering. Because of the separation of the steering and astern deflectors in the Hamilton Jet design, appropriate thrust vectoring using the steering joystick and throttle/reverse levers in unison will provide full rotational and translational control throughout the craft's entire speed range.

HI-TECH BRIDGE SETUP ON FAMILLE DUFOUR II

ROBUST ENGINEERING

Designed to transfer the full thrust load to the hull through the intake, each Hamilton Waterjet embodies robust engineering materials and construction techniques. Sophisticated finite stress analysis procedures are employed during the design process, coupled with sound manufacturing procedures to ensure an extremely rigid finished product. While the intake/transition of the HM811 jets are fabricated, extensive use of cast aluminium and stainless steel are used throughout the rest of each unit. This results in critical components such as the main thrust bearing being enclosed within a rigid module where they are unaffected by hull structure and movement for long component life and high reliability factors.

OPTIMUM PROPULSION

Although capable of accepting power inputs up to 3000kW each, the HM811 jets in *Famille Dufour 11* are 'derated' to absorb 1595skW at the gearbox shaft to return optimum efficiency at the vessel's design speed. Propulsion Efficiency (PC) is the measure of the efficiency of the conversion of shaft power to thrust to push the naked hull to its design speed.

The most important factor affecting jet selection is nozzle size, or in the case of multiple jets the combined area, with the 'optimum' nozzle size being that which results in the minimum power input to reach the desired vessel speed. As PC increases with jet (and consequently nozzle) size because of the higher component efficiencies in a larger jet, generally a combination of large jet, low power and high boat speed will return the highest efficiencies.

Simplistic selection on the basis of highest PC alone though may not offer the best economic solution. The HM811 jets for *Famille Dufour 11* were selected using software developed by Hamilton Jet which takes into consideration factors such as fuel cost and consumption, operating hours, payload, vessel economic life and discount factors etc. Using this software, the selected jets in *Famille Dufour 11* are those that return to the operators Maximum Transport Efficiency Factors with Minimum Lifetime Propulsion Costs, over the economic life of the vessel.

Combined with this extremely efficient propulsion system is the proven reliability of the Hamilton Jet design, minimal maintenance requirements and comprehensive local logistic support.