TECHNOLOGY FOR WATERCRAFT

CONTENTS

EXECUTIVE SUMMARY

TURBO WING TECHNOLOGY HAS BEEN RESEARCHED, DEVELOPED, TESTED AND REDUCED TO PRACTICE

- Wind Tunnel and Water Tunnel Tests
- Tests and Demonstration with Flying Model Aircraft and Powered Model Watercraft
- Flight Test and Demonstrations with Full Scale Aircraft
- Sea Tests and Demonstrations with Full Scale Watercrafts
- Covered by world-wide patents

TURBO WING TECHNOLOGY WILL

- Provide dramatic improvements in the performance and a 100% increase of security of the retrofitted aircraft
- Provide dramatic improvements in the performance of retrofitted watercraft
- Be the technology, that among other things permits the production of new aircraft with the capability to transport up to 3,000,000 pounds of cargo, 3,000 miles at 200 miles/h without refueling
- Be the technology, that among other things permits the production of new cargo water-crafts with the capability, at lower cost per ton-mile, to operate at higher speeds than current cargo crafts and to transport heavier payloads with extended range.

ECONOMIC IMPACT FOR INDUSTRY

- Dramatic increase in the profitable production of commercial, industrial and military aircraft
- Increase usage of watercraft as commuters and ferries along coastal waters
- Low cost retrofit for improved performance of crafts already paid for and in operation
- Dramatic increase in airport safety and capacity

ECONOMIC IMPACT FOR GOVERNMENTS:

- Provide a new major industry
- Rapid and low cost upgrading of civil and military systems
- Utilize labor force in distressed areas
- Maintain and increase lead in worldwide maritime operations
- Effective patrol and combat of search and rescue operations

ENVIRONMENTAL IMPACT:

- By retrofitting the aircraft we will reduce overall fuel consumption, exhaust, and noise pollution.

TURBO WING TECHNOLOGY DRAMATICALLY IMPROVES AIRCRAFT PERFORMANCE AND SAFETY

The adaptation of Turbo Wings to existing aircraft is accomplished by the addition of new Turbo Wings to the aircraft or by a simple, low cost modification to the existing wings so as to conform to a Turbo Wing.

PERFORMANCE IMPROVEMENTS:

- Drastic reduction of minimum flight speed
- Considerably increase take-off and landing lift capability . The Coefficients are between 5 and 8, depending on the wing/rotor configuration
- Level flight on rotors along
- Rate of climb at least doubled
- Take-off and landing distance 1/3 or less than those distances for comparable aircraft with conventional flapped wings
- For the same Take-off speed, take of gross weight 2 to 3 times that of conventional aircraft
- Operating range 50% to 100% increased
- Considerably less sensitivity to air turbulences

OPERATIONS AND SUB-SYSTEMS:

- Considerable increase in operational safety because of low minimum flight speed, low speed/short distance Take-off and anding, high climbing rate and ability to fly on rotors alone.
- System components readily available in aircraft inventory
- Operational and maintenance skill levels identical to those evels on conventional aircraft

A RELUCTANCE TO STALL:

In addition to improved performance capabilities of aircraft equipped with Turbo Wings, it is of extreme importance to point out that Turbo Wing has a reluctance to stall. This practical, essentially non-stalling capability of the Turbo Wing in itself provides an important factor of safety in flight not available in currently operating aircraft

RETROFITTING IMPROVES WATERCRAFT PERFORMANCE

Any marine craft, including hydrofoils, surface effect ships and SWATH crafts can be retrofitted with Turbo Wings by attaching the wing system to the crafts above the waterline.

The total lift of the wing plus rotor reduces the weight of the craft on the water and therefore reduces the drag on the hull. The forward thrust of the wing partially
overcomes the remaining drag of the hull. The power required therefore to move the craft forward is considerably reduced.

PERFORMANCE IMPROVEMENTS:

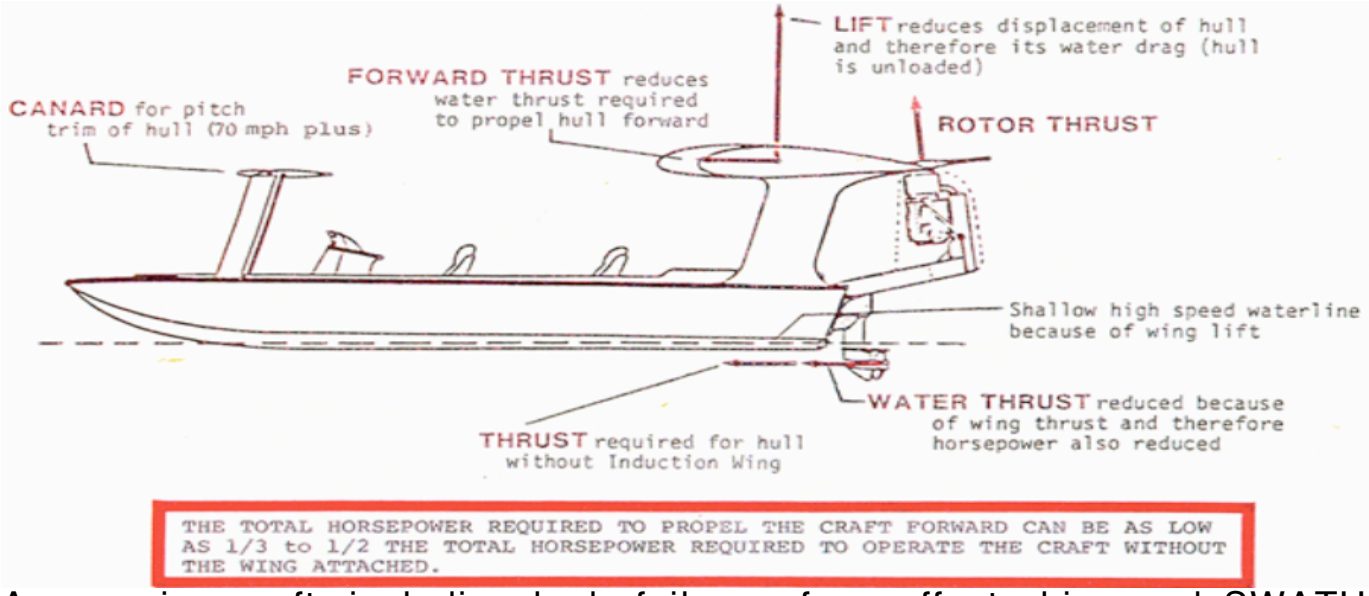
- Increased high speed capability, especially for search and rescue
- Improved craft stability and control at all speeds
- Reduced pounding, reduced vertical „G-Loads“
- Improved riding comfort
- Reduced power and fuel requirements
- Increased range per pound of fuel
- Reduced speed loss in high seas
- Increased acceleration from "in the hole planing"
- No increase in maintenance requirements
- System components readily available in marine inventories

OBJECTIVE:

To bring products and engineering innovations to a safer and more cost effective transportation environment for the world's public, commercial, military and
search & rescue transportation.

RETROFITTING IMPROVES WATERCRAFT PERFORMANCE

HERE IS WHAT HAPPENS IF YOU ATTACH THE WING TO A WATERCRAFT



Any marine craft, including hydrofoils, surface effect ships and SWATH craft can be retrofitted with the Turbo Wing Technology by attaching the wing system to the watercraft above the waterline.

The total lift of the wing/rotor configuration reduces the weight of the craft supported by the water and therefore reduces the drag of the hull. The forward thrust of the Turbo Wing partially overcomes the remaining drag of the hull. The power required therefore to move the watercraft is considerably reduced.

PERFORMANCE IMPROVEMENTS

- Increased high speed capability
- Improved craft stability and control at all speeds
- Reduced pounding, reduced vertical g-loads
- Improved riding comfort
- Reduced power and fuel requirements
- Increased range per pound of fuel
- Reduced speed loss in high seas
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TURBO WING TECHNOLOGY DEMONSTRATED ON WATERCRAFT

CAMPBELL SUPERWHALER RETROFIT

After a demonstration of this Turbo Wing retrofit to the United States navy, Bob Whelon, President of the Campbell Boat Company, Inc. said the following in a **Campbell Company Newsletter. "**The Turbo Wing modified Campbell 20" Superwhaler lofted 60% of the boat's weight out of the water, resulting in about a 60% reduction in drag. A high speed turn becomes more direct, controlled and flat with reduced slide slip. While demonstrating the craft, I drove this boat safely in excess of 65mph with seven adults aboard."

TURBO WING SEARAY RETROFIT

The Searay, allowing speeds of 50 knots, was used as an agent insertion boat for five hours in the vicinity of the MIUW radars and sonobuoys. With five agents aboard, the craft was not detected in calm seas during numerous transits from the N/V Baja Dream and PB 751 to the beach and return because of its high speed, low wake and reduced profile operations.

TURBO WING TECHNOLOGY DEMONSTRATED ON WATERCRAFTS

COMMUTER CRAFT

This 42 passenger Turbo Wing Designed Commuter Craft demonstrated excellent passenger comfort in rough waters and validated estimated improvements in performance.

TARGET BOAT

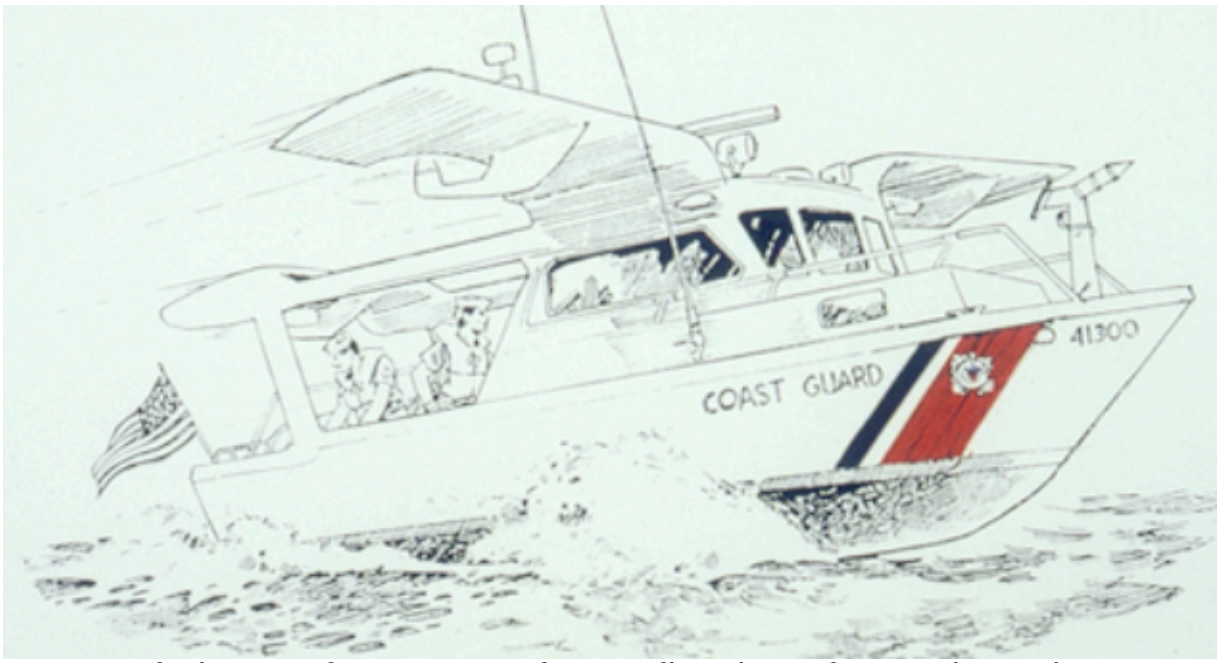
Designed from the ground up. Prototype watercraft employed a single wing/rotor. Power supplied to rotor by a hydraulic drive. Performance, maneuverability and controllability were excellent.

TURBO WING DRONE

This remotely piloted watercraft was designed under a Navy contract to be used for naval reconnaissance. Craft hat flight capability.

NAVAL PATROL CRAFT
PROPOSED WATERCRAFT CONVERSION

The 41 foot United States Coast Guard Utility Craft and similar patrol craft, continue to be reliable and efficient watercraft, used by governments worldwide. Retrofitting them with Turbo Wings as shown in the illustrations below, will dramatically improve their utility and economies as indicated in the data below.



Estimates of the performance of retrofitted craft are based upon water tunnel tests of models of basic hulls without and with Turbo Wing aerodynamic force systems, as well as upon various test with full scale watercraft as seen earlier in this brochure.

ITEM	**ACTUAL**	**RETROFIT**
Weight	31‘350 lbs	33‘000 lbs
Installed Horse Power	620 hp	620 hp
Maximum Speed	28 mph	45 mph
Cruise Speed	20 mph	32 mph
Water Drag	7‘660 lbs	4‘370 lbs
Lift to Drag Ratio	4	10.4

It is of importance to state that from the Water Tunnel tests of a 1/11th scale model of craft in rough water, the Lift to Drag Ratio of 10.4 only drops to a 9.5 Lift to Drag Ratio value. This means that in calm as well as in rough water, excellent transport efficiencies (High Lift to Drag Ratios) can be traded off for higher speeds and increased range. Most other advanced vehicles such as hydrofoils, SES's and SWATH crafts aside from their relatively high costs, suffer appreciable performance penalties when operating in rough water.

In irregular and following sea conditions (wave height of 2.2 ft. to 4.6 ft.) the data from water tunnel tests indicated that not only water drag reductions of 30% can be realized for the retrofitted craft but also a minimum of 20% reductions in vertical accelerations together with significant reduction in pitching movements.

Application of the Turbo Wing System makes it possible at low cost to retrofit in an orderly and efficient schedule, existing craft already paid for and in service. The result will be significant improvements in mission capability.

COMPARISON OF MISSION CAPABILITY

ITEM	**STANDARD BOAT**	**TURBO WING BOAT**
Range at Patrol Speed	390 Miles	730 Miles
Area Controlled at Patrol Speed	850 Square Miles	2400 Square Miles

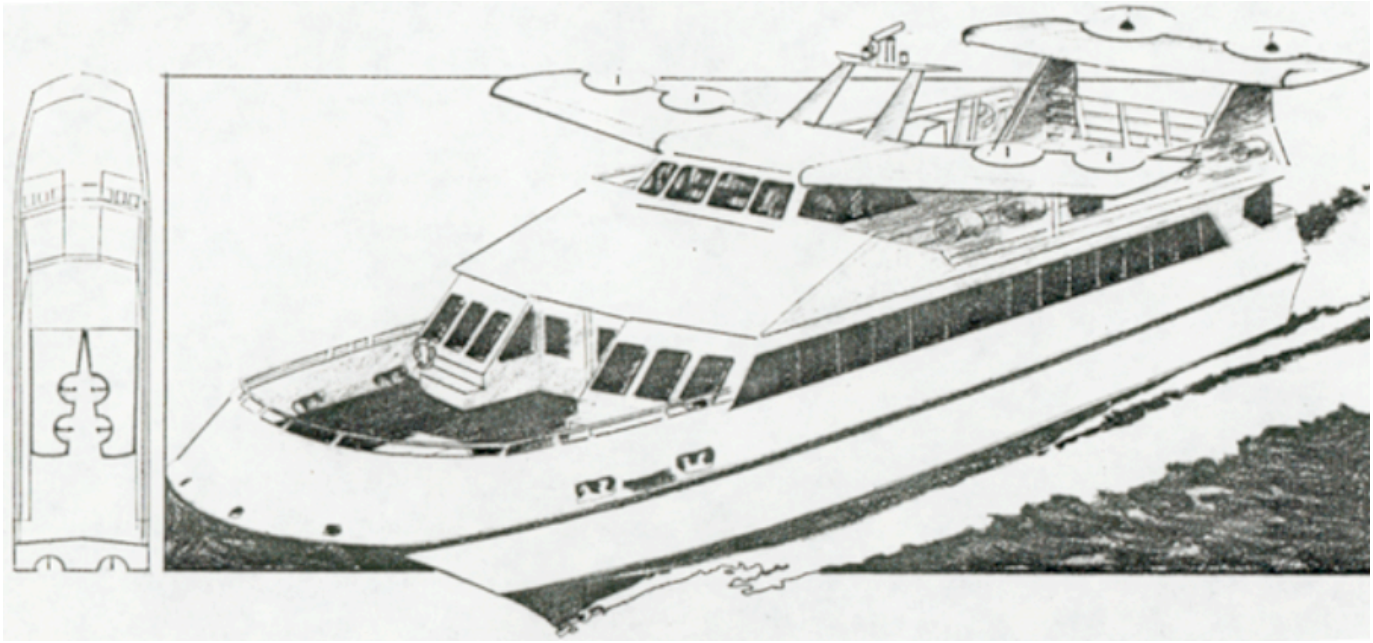
21st CENTURY TURBO WING BOATS

Water Craft with utilities and performance characteristics not heretofore contemplated become possible with the application of Turbo Wing Technology

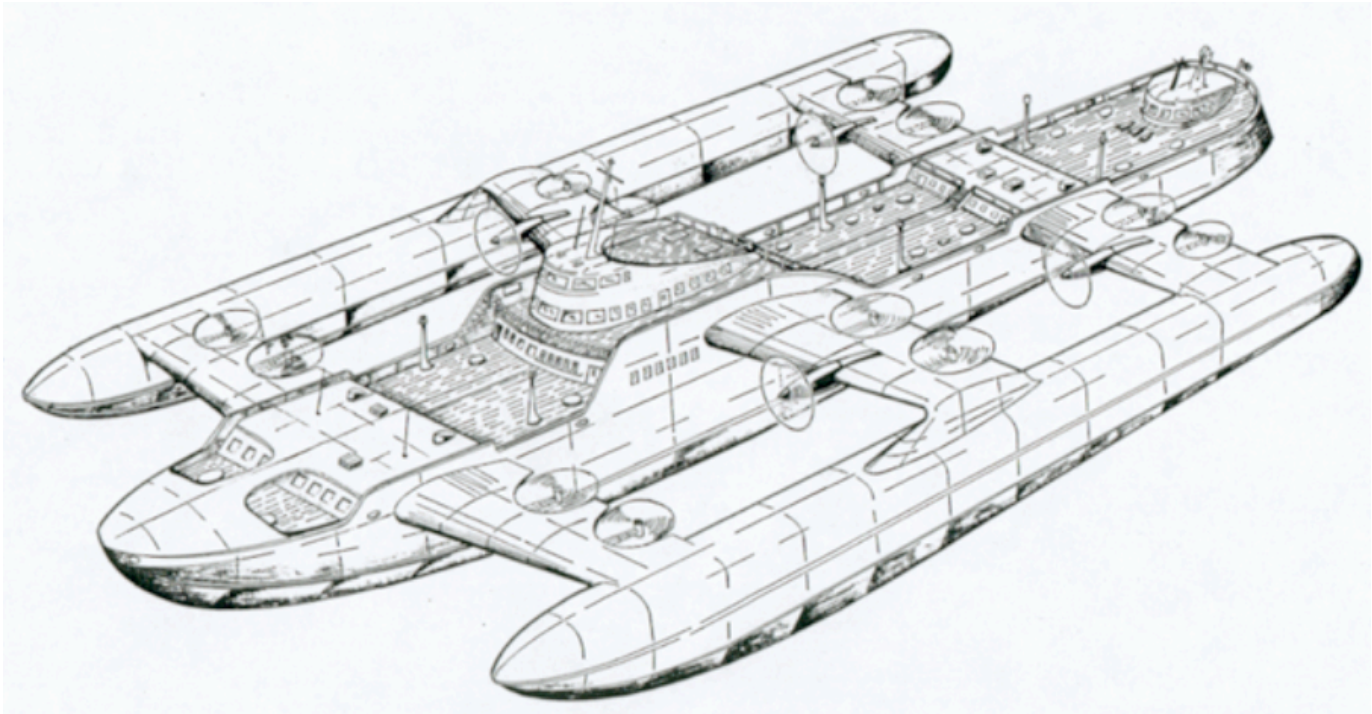
NAVAL PATROL CRAFT

UTILITY / LANDING CRAFT

TURBO WING

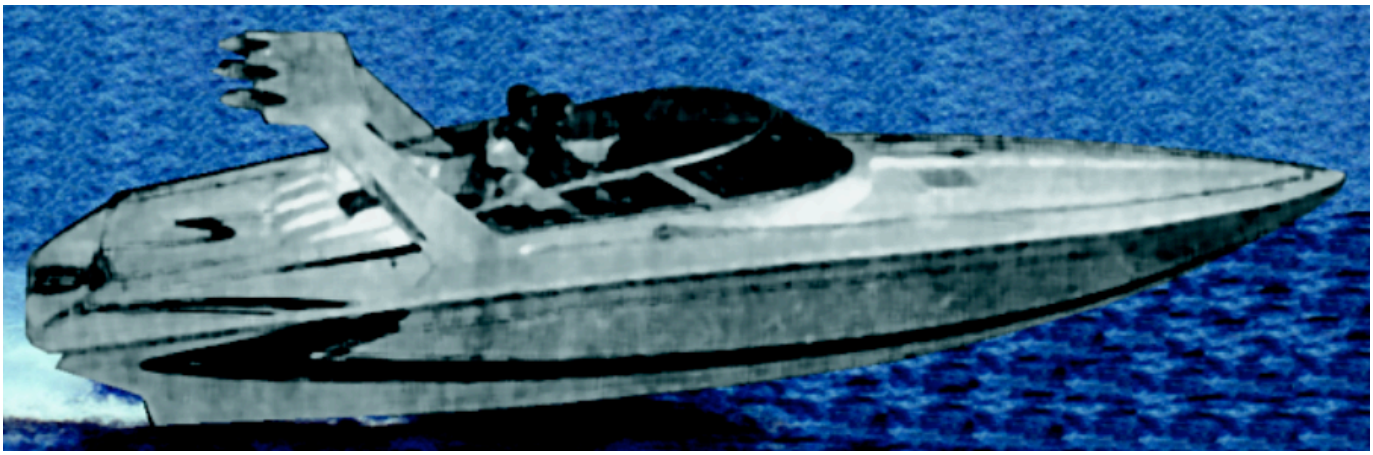


HIGH SPEED 200 PASSENGER COMMUTER

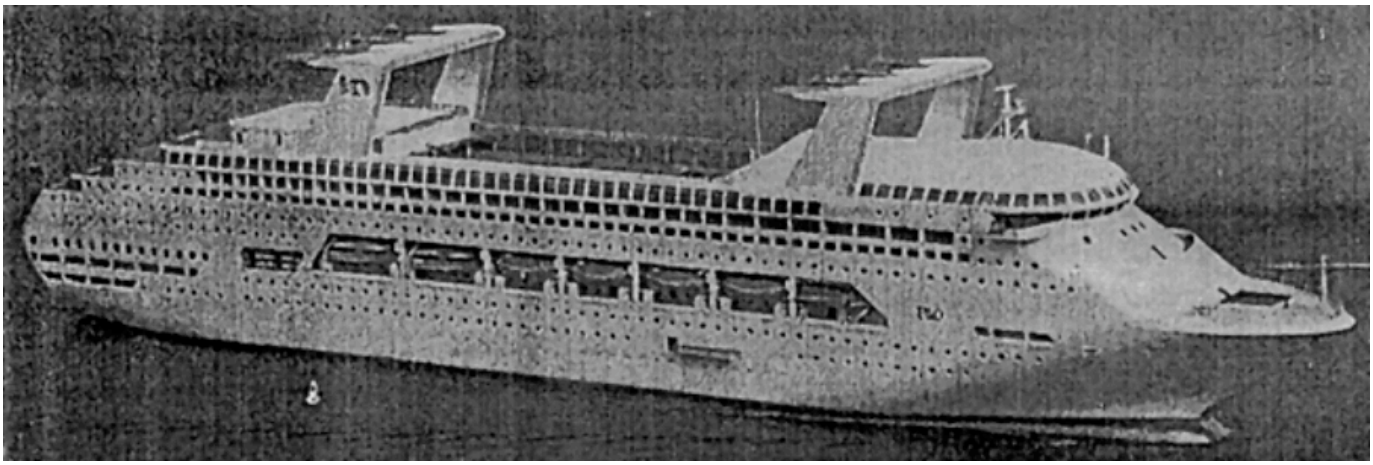


SUPER CARGO / TANKER SHIP

TURBO WING



HIGH SPEED RECREATIONAL WATERCRAFT



CRUISE / FERRY WATERCRAFT

WORLD WIDE
WATERCRAFT MARKET

The installation of the Turbo Wing System on a watercraft, regardless of size and configuration, will supply a lifting force and a forward thrusting force to the hull of the craft by virtue of the wing. The lifting force will reduce the water draft of the hull, and therefore the attendant water drag of the hull. The forward thrusting force provided to the hull by the wing, will move the watercraft through the water at increased speed because the water drag of the hull will be reduced by the action of the lifting force of the wing/rotor configuration. Alternatively, the forward thrust will permit the craft to maintain its regular cruising speed with less power, and therefore using significantly less fuel.

The net result of the retrofit is that the watercraft can have increased speed in all sea states and /or increased cargo capability or increased range if desirable. In all cases, the craft will have more stability and control effectiveness and without qualification will have significantly reduced pounding loads (vertical g-loads) in heavy sea states and first order improvements in crew safety.

A partial prediction of the watercraft market potential for a four year period is presented in the following table.