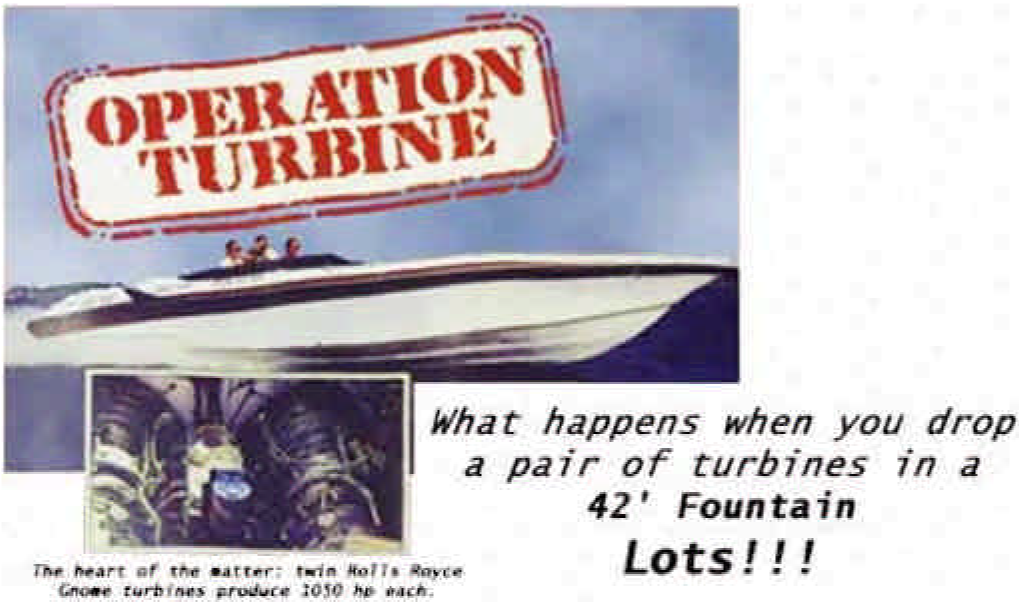

Historically, pleasure boats power plants have evolved from modifications of engine developments by the automotive industry. To a large extent this has been dictated by economic considerations since the volume of marine engine sales does not justify the capital expenditure required to develop engines specifically suited to marine applications from the ground up.

Unfortunately, automotive engines only approach the use of full power briefly during vehicle acceleration. In fact, 10-20 percent of full power is generally sufficient to maintain automobile cruising speeds. On the other hand, overcoming water resistance requires the continuous operation of marine engines at 70 percent or more of their full power in order to maintain cruising speeds. The result is that marine applications of automobile engines have much shorter service cycles, operating lifetimes and warranties than their automotive counterparts.

Although marine engines continue to be based on automobile technology, aircraft engines are more suitable in the marine environment. Like marine engines, aircraft engines experience continuous operation above 70 percent of their available power in order to keep aircraft flying. While all early aircraft have automotive reciprocating engines roots, the turbine was developed for military and commercial requirements. Now it's the engine of choice for high-power applications.

Expenses associated with production to meet reliability specifications necessary for safe flight operation, as well as military environments, has priced these engines out of the reach of most pleasure boaters. However, current availability of surplus engines, which can be refurbished at reasonable cost, has brought turbines into the marine propulsion picture.

Pioneers such as MTT Marine Turbine Technologies, Howard Arneson, Bernie Little and Lenname Turbine Vessels, Inc. have economically introduced turbines to pleasure boat applications. They had to overcome some hurdles to make these engines user friendly. Have they succeeded? Are turbines suitable to pleasure boat applications? Reggie Fountain of Fountain Powerboats joined forces with MTT Marine Turbine Technologies to find out. I had the opportunity to test the results of their efforts.

First, let me say that the use of turbines for marine applications is not new. Turbines appeared in offshore race boats in the 1960's. In recent years they have been the mainstay of hydroplane racing and have appeared as auxiliary power plants in high-speed boats. The Gentry Eagle, a recent transatlantic record breaker, used a 4500 horsepower Lycoming Turbine to augment its two diesels and add almost 20 mph to top end. In such special applications, users could tolerate operational characteristics which might be unacceptable to the casual boater. Ted McIntye, President of Marine Turbine Technologies (MTT) and Craig Muir, Vice President of Fountain Powerboats, believed that turbines would satisfy high-performance pleasure boater requirements and were determined to prove it. Reggie Fountain, a dynamic innovator in high-performance pleasure boats and offshore racing, eagerly backed the project. The result, a twin turbine-powered, stock 42-foot Fountain high-performance sportboat. Was the project successful? Read on. I met Craig Muir and Ted McIntyre at Slip 218 at the Marriott Marina on Biscayne Bay. The sun was bright and there was a slight breeze creating a mild chop on the water. It was a glorious day for boating.

The Fountain's beautiful lines were easy to spot as we approached the slip. The only indication that this wasn't a standard installation was the word "turbine" integrated into the hull striping along the side at the engine compartment. The interior was standard Fountain--first class.

Ted gave me a tour through the engine compartment. The engines, gearing and support systems fit right in. It's an impressive installation. We next moved on to the driver's console, which was slightly modified to include large compressor temperature gauges, and switches to activate turbine shaft brakes, fuel flow valve controls, and battery mode.

Ted initiated the start-up procedure. First, turn on the ignition switches which energize the starting motor, and ignite and wind up the compressor to 16 percent of full rpm. At this point, open the fuel flow valves. Hold the ignition key on until the compressor reaches 50 percent of maximum rpm and the turbine engine comes to life with a distinctive whine that's guaranteed to turn all heads at your marina.

Good batteries are essential but we stopped and started motors three times during a 20-minute period with no difficulty. The noise level was high, but not much higher than that with high-performance gasoline engines. Ted assured me that the noise level would go down when the compressor vanes opened to allow more air flow. I'm convinced that some more sound-proofing material in appropriate places will greatly improve the situation.

The start up is absolutely user-friendly and, in case you forget, there's a handy step-by-step procedure conveniently displayed next to the ignition switches. We were ready to go. Turbines generate lots of torque, and at a very fast rate. Standard hydraulic marine transmissions can't handle the load in a dynamic operating environment. This dictates the use of mechanical transmissions, called trash boxes, which are shifted into gear before engine start. The result is little or no practical maneuverability for docking. Most turbine marine applications use auxiliary power plants for docking, and start up the turbines only when underway. Howard Arneson uses electric trolling motors to maneuver his 32-foot catamaran around the docks. Ted McIntyre has taken a different approach with his "free turbine" engines to eliminate the need for auxiliary power.

Our test boat was equipped with hydraulic brakes to briefly slow down the drive shafts below 400 rpm while the mechanical transmissions were shifted. It worked acceptably adn we moved around the dock easily without incident. However, this is an area where a good hydraulic transmission would improve user friendliness since effective braking, shifting, throttling and steering takes some coordination. Ted is currently working on such a transmission development.

We exercised the shifting procedure and idled out into the Bay. Ted advanced the trottles and we were off. We rolled over the Fountain's bow wave and were on plane instantly with very little bow rise. Trim tabls were not required. No doubt that this performance was partially due to a weight saving of some 1,500 pounds with the twin turbine installation as compared to big-block, gasoline-engine power. In no time flat we were motoring along at 90 mph. Dialing in drive trim got us to a tick over 95 mph. I should have known we would easily achieve such numbers when Craig Muir confidently invited my friend and my wife to join us for the test. This is not the approach taken by someone worried about saving weight to optimize performance. Application of throttle along the mid-power range yielded awesome acceleration. The turbines provided all the power the props could absorb. I'm sure we could have overpowered the props to make them break loose any time we wanted by advancing the throttles more rapidly. I was really impressed. Oh, by the way, Ted was right about the noise going down when the compressor vanes opened. At speed, the sound level in the cockpit was no more than that with big blocks, and that included openings below the rear seat for air flow that certainly contributed to the sound level. Modifying the stock Fountain to take the air intakes out of the cockpit would not be difficult and would certainly reduce noise.

We didn't get a chance to really put this turbine Fountain through its paces because of calm seas. We did some high-speed turns, cruised easily at 85 mph and drove over the largest boat wakes we could find. The ride was outstanding. Now, anyone who has driven a Fountain power boat is guaranteed to come away impressed. However, I must say that this was the best riding Fountain I have ever been on.

It tracked as if on rails with absolutely no porpoising or chine walking. After going airborne over boat wakes it maintained perfectly flat through landing. There was no tendency to land stern down as is the case with many high-performance V-bottoms weighted as far astern as possible to enhance top end. I attribute this performance to light weight of the turbines married to Fountain's drive set-up. Our boat had MerCruiser VI drives, i.e. the Kiekhaefer surface drives, which were mounted at Fountain's standard "X" dimension with 18 1/2 inches between propshaft centres. Props were 18" x 31" Kiekhaefers turning inward to increase bow lift to compensate for the light weight turbines. Drive gearing was 1.35:1. The transmission was 1:1 Mercury Daytona.

The Rolls Royce Gnome turbines produce 1050 hp each at a turbine shaft speed of 19,500 rpm. The compressor has a top speed of 26,300 rpm. A 3:1 reduction gearbox incorporated in the turbine shaft reduces top driveshaft speed to 6,500 rpm. The complete engines weigh less than 400 pounds each and are 73" long and 20" in diameter fully marinized. The engines are air cooled and therefore not subject to overheating due to problems with water pickups. Fuel can be kerosene, #2 diesel or jet-A, and comsumption is 88 gph at wide open throttle. They can run all day at 85 percent of full throttle delivering a cruising speed of 80-85 mph as set up in the Fountain. Operating life is 1500 hours, about five times that of high-performance gasoline engines. Required maintenance is an oil change once a year.

I have no doubt I was riding the wave of the future. In fact, if not for common misconceptions about turbines, and force of habit, the future would be now. People are afraid of turbines likening them to flame throwers waiting to explode. Nothing could be further from the truth. Turbine fuel is not volatile in stored state and is even used for cooling. Our test turbines were equipped with temperature protection systems to effect shut down if temperatures rise too high as well as speed protection to dump fuel pressure resulting in shut down within seven milliseconds in the event of over-revving. Concerns relative to saltwater corrision have been addressed and with similar freshwater hosedown and flushing required for a gasoline engine, saltwater operation can be equally trouble free. After all, turbine-powered helicopters have been used for sea rescue for years.

Current cost is also reasonable although expected to come down when sale volumes are sufficient to justify direct production for pleasure boat purposes. At $100,000(US) each complete, our test boat engines compete well with the price of similar powered diesels having 10 times the weight. Although twice the price of similar powered gasoline engines, turbines have five times the life, lower fuel and maintenance costs and are less than 1/3 the weight.

I am sold on turbines for high-performance boating as well as high-speed luxury motor yachts. Imagine having an engine that can produce 1000hp and run efficiently near wide open throttle all day long without trouble.

Turbine power is becoming more evident every day on the high-speed pleasure boating scene. The Ted McIntyres and Howard Arnesons will continue to develop innovations to make turbines more user-friendly for pleasure boaters. Progressive boat builders like Reggie Fountain will incorporate them in competitive offerings to their customer base in the not too distant future.

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