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QUASITURBINE
LOW RPM HIGH TORQUE PRESSURE DRIVEN TURBINE FOR TOP EFFICIENCY POWER MODULATION (*)

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ABSTRACT

The Quasiturbine turbo-machine is a pressure driven, continuous torque and symmetrically deformable spinning wheel. Excluding conventional turbines, the next step in the world of engine research is to make the gas engines as efficient as the diesel engines and the diesel engines as clean (or better) as the gas engines. Turbine characteristics help achieving this goal. The Quasiturbine (Qurbine or Kyotoengine) is a new engine technology that was conceived in early 1990 and patented in 1996 and later. The Quasiturbine is inspired by the turbine, perfects the piston and improves upon the Wankel engine. Efficient and compact, the Quasiturbine is also an engine concept optimization theory based on « volume pulse shaping » at design. While current technologies adapt combustion processes to engine design, the Quasiturbine theory tends to adapt the engine design to combustion processes. It is a non-eccentric crankshaft, true rotary engine (no piston like movement), that uses a 4 face articulated rotor with a free and accessible center, rotating without vibration nor propulsive dead time and producing a strong torque at low RPM under a variety of modes and fuels. The Quasiturbine goes along the best modern engine development strategy, which is to get as many ignitions as possible per minute, with a mechanical device rotating as slowly as possible.

Quasiturbine allows designs with up to « 7 conceptual degrees of freedom », substantially more than conventional turbine or piston engine, permitting to better shape the compression and relaxation volume pulse and further improved optimization. Taking full advantage of its unique short and fast linear ramp volume pulsed properties, its AC Model is a natural HCCI « detonation - knocking » engine. Such a detonation Quasiturbine has very little low-power-efficiency-penalty, is multi-fuel compatible (including direct hydrogen combustion), offers a drastic reduction in the overall propulsion system weight, size, maintenance and cost. Because Quasiturbine cycle is pressure driven instead of aerodynamically driven, it has a comparatively flat high efficiency characteristic in regard to RPM, load and power, which makes it most suitable for power modulation applications like in transportation and windmill energy storage and recovery systems. Used in Stirling and Brayton cycles, the Quasiturbine offers new ways to recover and transform thermal energy.

INTRODUCTION

The objective of this paper is to give an overview to the engine community of a new technology conceived in early 1990, patented in 1996 and later and called Quasiturbine. Why the name Quasiturbine? Because just like the conventional turbine, Quasiturbine has a (quasi) continuous flow at intake and exhaust, propulsive dead time is zero and torque impulses are consecutively jointed for uninterrupted torque. The Quasiturbine turbo-machine is a pressure driven, continuous torque and symmetrically deformable spinning

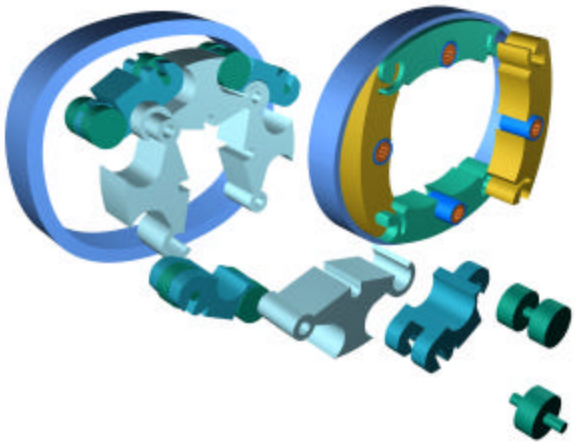

Figure 1. Two of the Quasiturbine family designs: Model AC (with carriages) on the left and SC (without carriage) on the right.