LiquidPiston unveils quiet X Mini engine prototype

21 November 2014, by Nancy Owano

Credit: Donal Boyd

LiquidPiston has a new X Mini engine which is a small 70 cubic centimeter gasoline powered "prototype. This is a quiet, four-stroke engine with near-zero vibration. The company said it can bring improvements to applications such as lawn equipment, small generators, mopeds, auxiliary power units for boats, and UAVs. The engine's improved noise, vibration and harshness (NVH) characteristics, said the company, will increase product performance, enhance operator comfort and prolong application life.

The X Mini is based on LiquidPiston's thermodynamic cycle and engine architecture; it can run steady state with air-cooling. With the X Mini, the company said they can now show that their engine technology can scale down in size and can be configured for spark-ignited operation to support both gasoline and diesel applications. The engine has only two primary moving parts, a shaft and rotor, a 4-pound core and fits in a 6.6" x 6.2" x 5.4" box. The company said tests showed high power density, producing 3.5 horsepower (indicated at 10,000 RPM).

"Except for ancillary parts such as injectors, fuel pumps, and oil pumps, there are no other moving parts," according to the company.

The president and co-founder, Dr. Alexander Shkolnik, said the team had plans to further optimize the engine for increased power (greater than 5 horsepower) and efficiency, and lower operational noise. According to the company release, "When mature, the engine is expected to weigh 3 pounds, produce over 5 horsepower at up to 15,000 RPM, and be over 30 percent smaller and lighter than comparable four-stroke piston engines."

While it is a rotary engine, the company points out that the X Engine is not a Wankel engine, as it has "a fundamentally different thermodynamic cycle, architecture and operation."

Shkolnik co-authored a paper, "Development of a Small Rotary SI/CI Combustion Engine," which described small rotary internal combustion engines developed to operate on the High Efficiency Hybrid Cycle (HEHC). "The cycle, which combines high compression ratio (CR), constant-volume (isochoric) combustion, and overexpansion, has a theoretical efficiency of 75 percent using air-standard assumptions and first-law analysis." Similar to the Wankel rotary engine, the 'X' engine has only two primary moving parts, they said, but unlike the Wankel, "the X engine is uniquely configured to adopt the HEHC cycle and its associated efficiency and low-noise benefits. The

result is an engine which is compact, lightweight, low-vibration, quiet, and fuel-efficient."

LiquidPiston adopted the saying "Think Outside the Cylinder" as their philosophy, on the premise that by rethinking the engine, starting with basic scientific principles (e.g., thermodynamics), engines can be significantly improved on all parameters.

The company is upbeat that the X Mini may enable new applications not possible with current engine technology; early next year, they will host an open call for ideas about new applications with a cash prize for the most innovative submission.

More information: LiquidPiston Unveils Power-Dense, 70 Cubic Centimeter, Gasoline Powered "X Mini" Engine Prototype, PDF: liquidpiston.com/wp-content/up … Engine-Prototype.pdf

APA citation: LiquidPiston unveils quiet X Mini engine prototype (2014, November 21) retrieved 7 December 2021 from https://techxplore.com/news/2014-11-liquidpiston-unveils-quiet-mini-prototype.html