ABSTRACT New Engine Technology - “Air-Sealing”

6th International Conference and Exhibition on Automobile & Mechanical Engineering

Colin G Young

Dynex International Pty Ltd
3 Margaret Street, Parkdale, VIC 3195, Australia
dynex@optusnet.com.au

The new technology uses “*air sealing*” in lieu of conventional *mechanical* sealing, and is designed for (a) Horizontally-Opposed / Scotch-Yoke (H-O / S-Y) piston engines, and (b) Twin-Wedge Oscillating and (true) Rotary engines, where the pistons / rotors are *positively* and accurately located, such that they do *not* touch their mating components, but maintain a *tiny* clearance between them.

It is fully realised that “air sealing” will *not* provide a *perfect* seal, but the technology also recognises that perfect sealing is *not* required as the higher compression-ratio and induction air-pressure compensates for the (small amount of) by-pass gases.

The technology is designed to permit lighter, lower, quieter’ reduced-cost, and more-compact engines.

Using "air-sealing", there is virtually *no* friction between the primary mating components, with *no* lubrication required, *no* wear, and thus provides an ultra-long service life. It uses a *labyrinth* of grooves, which are skilfully-designed to most-efficiently generate extremely high-speed eddy currents of the air, so as to provide effective sealing.

Advantages of “air-sealing” include: providing a pressurised stratified-charge air-fuel mixture for improved combustion; providing an effective “*after-burn*”; providing *higher* fuel economy and *higher* (thermal, mechanical and volumetric) efficiencies; providing significantly *lower* friction; allowing for a liquid and air “*minimal-cooling*” system; continually cleaning internal components, especially spark-plugs and fuel injectors; significantly reducing all *four* harmful emissions; and requiring a less-powerful (air-operated) starter motor;

A turbo-charger or super-charger, and a standard electronic fuel-injection system, are used.

While *conventional* cylinder-heads and poppet valves *can* be used with H-O / S-Y piston engines, the overall performance is *further* enhanced by the use of *rotary inlet-only* valves. The inlet valves have only (relatively) cool air, rather than extremely hot exhaust gas, passing through them, hence the severe problems of sealing-efficiency, lubrication, and excessive wear with *rotary exhaust* valves are eliminated.



Figure 1: Conventional Piston, with mechanical sealing rings

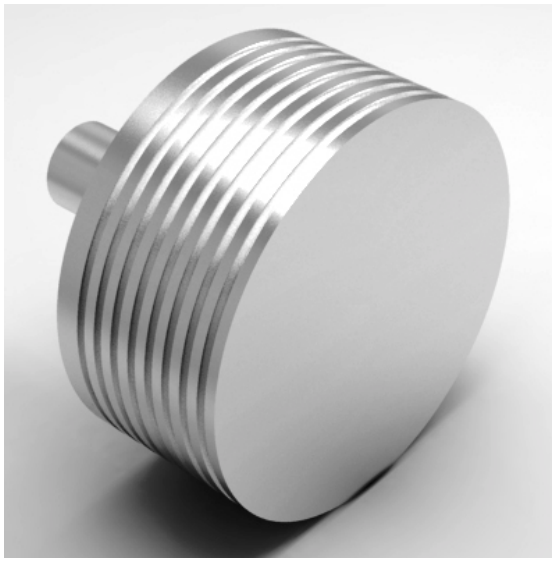


Figure 2: Air-Sealing Piston, with multiple angled air grooves

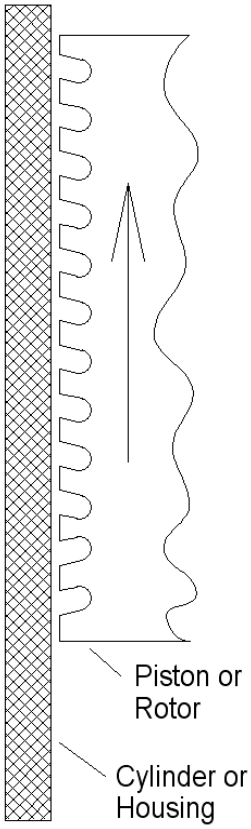


Figure 3: Principle of air-sealing grooves

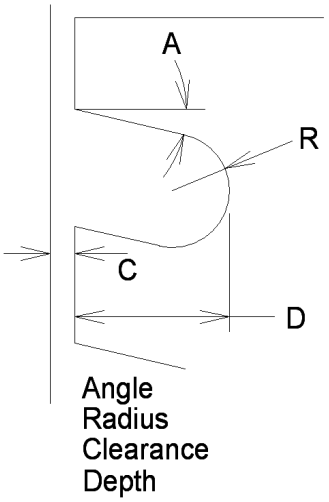


Figure 4: Design variables that influence the sealing efficiency of the grooves

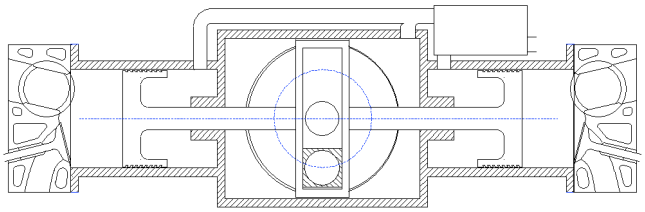


Figure 5: *Inlet-Only* Rotary Valves

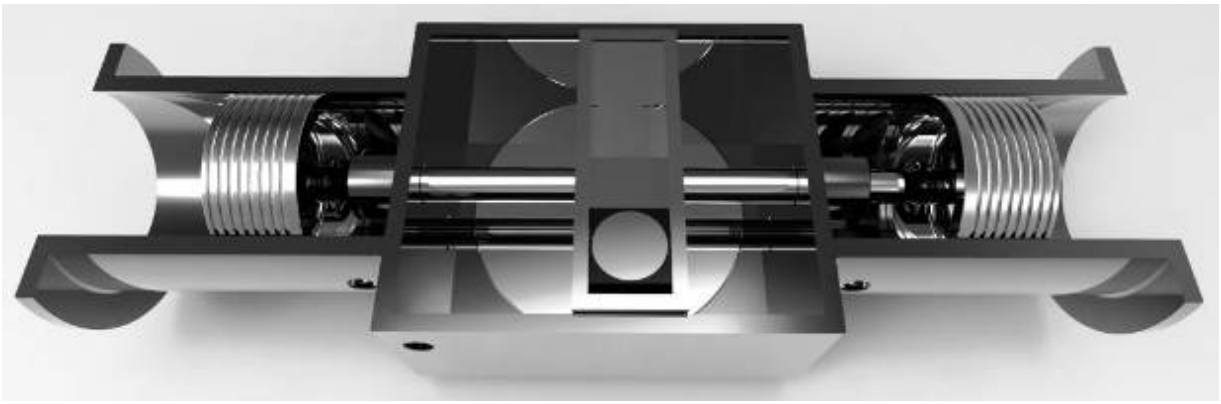


Figure 6: Layout of Horizontally-Opposed / Scotch-Yoke (H-O / S-Y) engine, with Air-Sealing Pistons

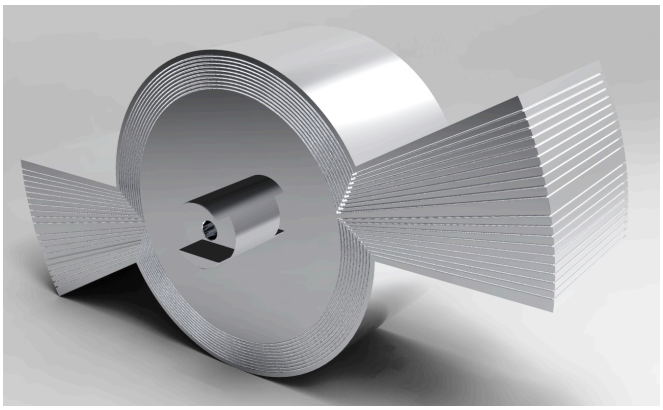


Figure 7: Twin-Wedge Rotor – Single Oscillating Variant, with Air-Sealing Groove Labyrinths

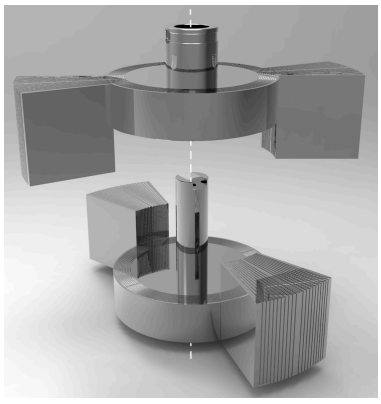


Figure 8: Twin-Wedge Rotors – Dual Oscillating & (True) Rotary Variants