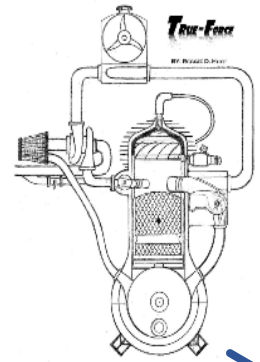




2-STROKE CRANK/LEVER PISTON ENGINE

= HIGHEST PISTON ENGINE POWER
DENSITY & COMBINED BTE IN THE WORLD



PATENTS PENDING

DESIGN FLOW CHART

2-STROKE PISTON BASE DESIGN w/SIDE CYLINDER
INTEGRATED PORT/VALVES = NO POPPET VALVES

ROLLER CRANK & ROD BEARINGS
= LOW OIL PRESSURE REQUIRED

RAISED CYL-PORT HIGH FLOW & SPEED REED TYPE INTAKE VALVE = EXTREME
SIMPLE & LOW COST 5D CVVT = INCREASED TIMING RANGE & VOLUMETRIC
& GAS EXCHANGE EFFICIENCY = **Alpha-Otto & Achates design liability eliminated**

FULL FLOW & DURATION CONTROL NO SPIN THROUGH SIMPLE LOW-COST
LOWERED EXHAUST VALVE = **Alpha-Otto overly complex, energy wasting, speed-flow
restricting and unpatentable constant spin through rotary exhaust valve eliminated**

LOW-COST & RELIABLE APPLICATION OF CERAMIC AS
COMBUSTION CHAMBER WITH CENTER SPARKPLUG

CRANKCASE PD PRESSURIZED
DRY SUMP OILING

TURBOCHARGE INDUCTION W/ HYBRID SWITCH OUT CRANKCASE PD OR
ELECTRIC DRIVE & ENERGY COMPOUNDING SYSTEM = **Alpha-Otto
low efficiency PD supercharge system liability eliminated**

LOWERED PISTON PIN = CYL SIDE LOADING SHIFTED TO BOTTOM OF PISTON

RINGLESS COMBUSTION SEALING = NO RING GROVES, GAS OR OIL HOLES OR
VALVE RELIEFS & LOW SIDE LOADING = LOW-COST & RELIABLE APPLICATION
OF CERAMIC AS PISTON TOP = COMBINED WITH CERAMIC COMBUSTION
CHAMBER = MAXIMIZED BTE & MINIMIZED BLOWBY = BLOWBY CAN
ONLY PASS TO TURBO NOT CRANKCASE = NOT WASTED = **no rings
passing over ports & ring friction decreased over standard instead of increased = Alpha-Otto
& Achates fatal flaw & friction liability flow (equals two (2) flaws) eliminated**

RINGLESS COMBUSTION SEALING = NO RINGS
PASS OVER FUEL INJECTION PORT = ALLOWS FOR
SIDE CYL APPLICATION OF INDIRECT DIRECT
FUEL INJECTION (IDI) = NOT EXPOSED TO HIGH
HEAT & PRESSURE = HIGHER EFFICIENCY &
EMISSION CONTROL THAN PORT FUEL INJECTION
LESS COMPLEXITY & COST THAN DI
= **Alpha-Otto design liability eliminated**

INTEGRATED COMBINED FORCED
INDUCTION & OIL INTERCOOLING

360° COMBUSTION
CHAMBER CYCLONE FIRE
FUEL INJECTION = **NOT
feasible with Alpha-Otto OR
Achates**

FULL ENGINE COOLED WITH ONLY AIR & AIR TO OIL = **Alpha-Otto & Achates liability eliminated**

THE ABOVE REPRESENTS THE HIGHEST POSSIBLE PISTON ENGINE POWER DENSITY COMBINED
WITH BTE & HARMFUL EMISSION CONTROL BEFORE ADDING THE SIMPLEST, LOWEST COST,
MOST RELIABLE & ONLY CYCLE-TO-CYCLE INSTANTANEOUS @ ALL SPEEDS & CONDITIONS
CONTINUOUS VARIABLE COMPRESSION RATIO (CVCR also in development) SYSTEM.