Innovative and Sustainable Internal Combustion Engine

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Abstract
Heart Combustion Engine S. r. l. is an Italian startup that has developed an innovative internal combustion engine. This engine, patented in Europe and being implemented in other non-European countries, is characterized by one or more cylinders, inside which a piston with variable strokes slides. This piston performs the intake, compression, burst and exhaust phases with the aid of the rotation of two crankshafts through an angle of 360°. We have successfully completed a fully functioning single-cylinder prototype, which showed a 37% increase in expansion volume compared to intake volume. The engine can operate using petrol and is also compatible with a wide range of fuels used in combustion engines. The latter operates following a four-stroke cycle with a total duration of 360°, unlike the traditional cycle which requires 720°, and despite this it manages to develop a power increased by 130% compared to similar traditional engines which aspirate the same quantity of air. A distinctive feature of our engine is the ability to adjust degrees of suction versus expansion to suit project specifications, offering greater flexibility than traditional engines that operate on fixed 180° steps. Additionally, our engine allows significant variations in the compression ratio via a simple drive which has been integrated into the approved patent. Another improving feature is evident in the expansion phase, where the connecting rod connected to the piston descends almost parallel to the cylinder walls, significantly reducing friction on the cylinder surface. Our engine has been designed to suit a wide range of applications, including traditional combustion engines, hybrid engines, marine engines, electric generators and cogenerators. The cycle can be customized in various ways to meet specific needs. The thermodynamic calculations carried out demonstrate a significant reduction in the temperature of the exhaust gases, greater than 154°C in the prototype created. Internal energy recovery per cycle has an extremely positive impact on the sustainability of the engine.