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Fuel-free Pulse Engine could power city cars by 2010

Internal combustion engines could be a thing of the past if a prototype reciprocating engine that requires no cylinder-head and no valve-gear successfully completes a rigorous series of field trials.

Developed in Germany by Dr Fritz Fabel of the Eingebildet Elektromagneticshe Institut (EEI), the so-called 'Pulse Engine' requires only minute pulses of current to drive a crankshaft rotating in a conventional manner. Exact details remain confidential pending the granting of a formal patent but it is understood that the principle involved is similar to that associated with an electromagnetic solenoid.

Momentary reverse excitations of an electromagnetic coil successively repel and attract a permanent-magnet piston partially enclosed within the coil. The piston performs as a self-acting connecting rod, which is attached to a crankshaft that turns a carbon drive-shaft. As every movement of the piston constitutes a 'power' stroke, mechanical losses are minimal, and the Pulse Engine is said to operate at 2.85 times the efficiency of a petrol engine, yet it requires no fuel and has no direct emissions.

In common with rotating electromechanical devices, the Pulse Engine attains peak torque at very low rpm, eliminating the need for step-down gearing except to enable a reverse function, which is electronically regulated to ensure safe operation. The speed of the Pulse Engine is controlled by an air-cooled thyristor, which varies the amplitude and duration of a 'chopped' sinusoidal wave that draws only micro-amps from a small nickel-cadmium battery pack that can be recharged from a domestic supply. The energy consumed in re-charging the battery is equivalent, in CO₂ terms, to tailpipe emissions of 0.85 grammes per driven kilometre.

Production versions of the Pulse Engine are expected to comprise two pairs of solenoids arranged in V-formation, the pistons of which are connected to a common crankshaft in the manner of a V4 internal-combustion engine. To ensure smooth motion, the successive excitation pulses will occur at precise 45-degree intervals in a sequence asymmetrically distributed amongst the four solenoids. A small flywheel will be attached to the crankshaft in order to optimise NVH values.



According to Dr Fabel, a two-seater car similar in size to a smart, and weighing 800 kilos, will be able to cover a range of up to 250 kilometres on a single, four-hour charge. "We envisage that the Pulse Engine will be used in a small city car running at urban speeds," says Dr Fabel, "although there is no reason why the engine could not be run at much higher speeds provided that range limitations are acceptable."

A number of manufacturers are said to be interested, and one industry source has suggested that Pulse Engine cars might be seen on the streets of Tokyo "...before this decade is out".