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Rotary-Trochoidal Engine Nomenclature and Terminology – SAE J1220

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1. Preamble—The rotary-trochoidal engine derives from the basic configuration invented by Felix Wankel. Various known as rotary, rotating combustion, or Wankel engine, it is here designated rotary-trochoidal. This more descriptive term will also serve to differentiate this engine from other positive displacement rotary engines. In the configuration as defined herein, this internal combustion engine is operated on a four-stroke cycle and incorporates a three-sided rotor which revolves in timed relationship within a two-lobed rotor housing.

The purpose of this report is to establish definitions of terms and basic quantities of the rotary-trochoidal engine in order to facilitate comparison of various engines in this category. This should permit members of the various disciplines associated with this engine to agree on the terminology for the components and terms unique to this engine. These definitions concentrate on those areas where this terminology diverges from conventional piston engine practice.

2. Principal Elements (Other Than Sealing Elements)

2.1 Rotor Housing—A housing having an internal trochoidal shaped sealing surface radially enclosing the rotor and usually incorporating provisions for housing cooling, porting, and ignition source.

2.2 End Housing—A housing at either end of the engine providing a flat sealing surface for the rotor side and usually incorporating provisions for cooling and porting and for mounting of main bearings and stationary gears. May be further characterized by descriptions of application and/or function such as upper, lower, front, rear, drive, anti-drive, etc., it may also have provisions for an ignition source.

2.3 Intermediate Housing—A housing in a multi-rotor engine positioned between rotor housings have two parallel and flat sealing surfaces for the side(s) of the rotors (rotor side(s)). May incorporate provisions for cooling, porting, bearing, stationary gear(s), and ignition source.

2.4 Rotor—The principal moving power element in a rotary-trochoidal engine which transfers combustion gas forces to the crankshaft. It incorporates provisions for a sealing system and a gear. (See Fig. 1 for identification of rotor sub-elements.)

2.5 Rotor Gear—The internal gear which is either attached to, or integral with, the rotor and which in conjunction with the stationary gear establishes the angular relationship of the rotor to the trochoid surface and crankshaft. (See Fig. 1.)

2.6 Stationary Gear—The external gear which meshes with the rotor gear and is fixed to the end or intermediate housing. (See rotor gear.)

2.7 Crankshaft—The main shaft of the engine about which the rotor(s) revolve and which, by virtue of the eccentricity of the rotor journal(s) to the main journals, converts gas forces acting on the rotor into torque.

3. Sealing Elements

3.1 Apex Seal—The primary gas seal between adjacent combustion chambers, located in each apex of the rotor, and in contact with the trochoid. It may be of a single or multi-piece design. (See Fig. 2.)

3.2 Side Seal—The gas seal located in the rotor side, usually extending from one apex to the next and contacting or abutting the button seal, and in sealing contact with the end or intermediate housing flat sealing surface. (See Fig. 3.)

3.3 Button Seal—The element located in the rotor side at the apex providing gas sealing means between the apex seal and side seals, and in sealing contact with the end or intermediate housing flat sealing surface. (See Fig. 4.)

3.4 Seal Springs—Each seal element may have an actuating spring or springs whose name is associated with the seal it is used in conjunction with such as apex seal spring, side seal spring, etc.

3.5 Rotor Oil Seal—The sealing elements, usually circular in shape, which are used to prevent leakage of oil into the combustion chambers.

4. Terms

4.1 Rotor Numbering System—Rotors, rotor housing, etc. in multi-rotor engines shall be numbered from anti-drive end of the engine.

4.2 Top Dead Center (Firing)—The minimum chamber volume position of the rotor relative to the combustion side of the minor axis. For purposes such as port timing, spark timing, etc., zero crankshaft deg (0°) shall be taken as top dead center (firing).

4.3 Cell—The volume enclosed by one rotor flank, the rotor housing, end housing, and adjoining end or intermediate housing.

4.4 Cell Swept Volume—The difference between the maximum volume and minimum volume of a cell. The four basic geometric parameters of the rotary-trochoidal engine, as shown in Fig. 6 can be used to calculate the cell swept volume by the formula $V = 3\sqrt{3}(eR_bW)$.

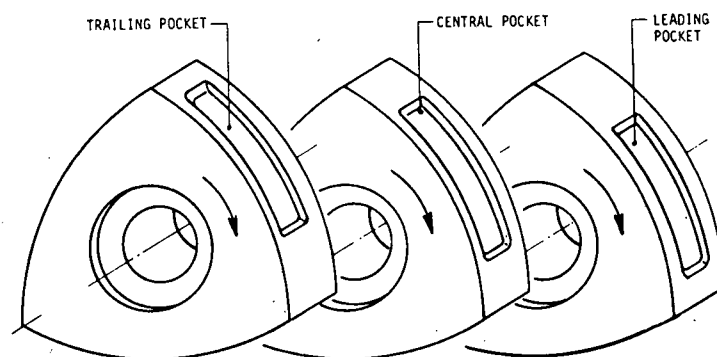
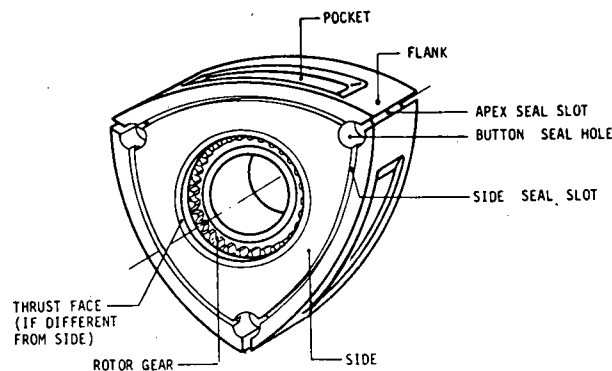
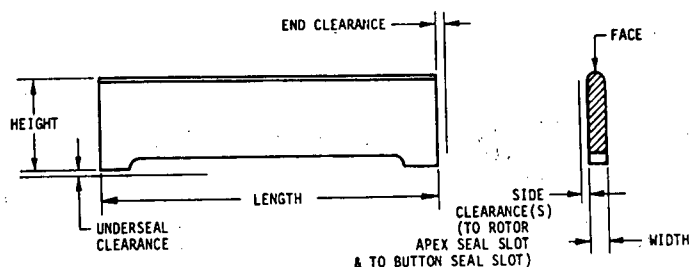


FIG. 1—ROTOR



MULTI-PIECE APEX SEAL
DESIGNS

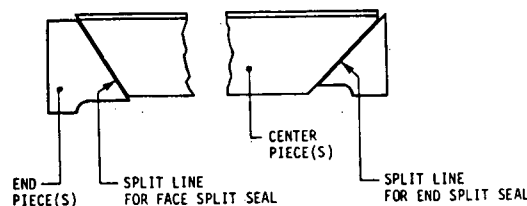


FIG. 2—APEX SEAL