

## Centrifugal Fuel Cell

### Description

Fuel cells are poised to become the predominant source of power for vehicle propulsion in the future. Although handicapped by high production costs, car manufacturers are investing heavily in Hydrogen fuel cell technology in the hope to bring these down. One of the biggest problems of hydrogen fuel cells is the need to safely store an adequate supply of hydrogen on board the vehicle, and concerns about safety issues relating to vehicle crash-worthiness. In-vehicle reforming of hydrocarbon fuels at high temperature is an alternative solution. However, this process is energy-intensive and may in practice reduce the overall efficiency to little more than that of a conventional engine while increasing greenhouse gases emissions.

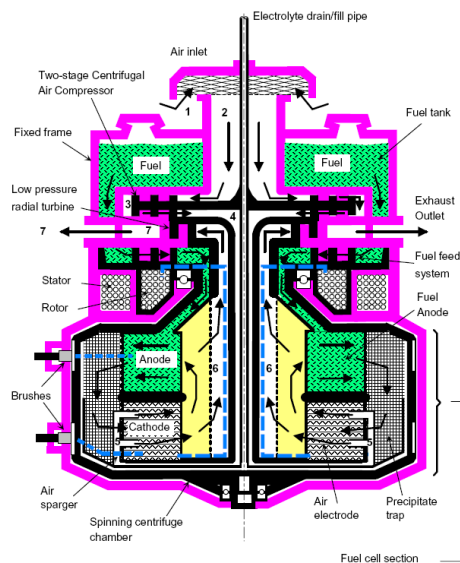
This invention proposes an alternative concept of rotating metal-air fuel cells in which centrifugal force is used to substantially enhance the natural circulation of liquid electrolyte around the reaction chamber, eliminating many engineering problems that have beset previous developments of this device. The present centrifugal metal-air fuel cell is a new concept in vehicle power sources, with a new simplified overall design, offering many advantages over conventional non-rotating fuel cells. As a compact electrochemical power unit with 3-dimensional porous electrodes, the spinning metal-air device offers high energy density and specific power. Using powdered metal as fuel and atmospheric air as oxidant, this low-temperature 'engine' is clean, efficient and safe, having a gross energy conversion estimated at over 80%.

### Innovative aspects and main advantages

- Improved power and electrolyte control using spin speed to optimise system functionality
- Increased power density
- Compact energy efficient design (energy conversion efficiency > 80%)
- Fully-integrated 'stand-alone' power unit
- Efficient also in micro-gravity environment
- Electrochemically regenerative (zinc-air device)
- Particularly adequate for 'closed-cycle' operation

### Areas of application

- Stand-alone power source
- Transportation (terrestrial, space)



Highly conceptualized Centrifugal Fuel Cell

### Stages of development

Patent Priority date 20/10/1997  
 Patent granted AT BE GE DK SP LU FI  
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Prototype zinc-air device

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