



HyFish Flying Fuel Cell Demonstrator

Project Description

The Institute of Technical Thermodynamics of the German Aerospace Center in Stuttgart is developing, together with partners from industry, a fuel cell system for a variety of applications, including the HyFish demonstrator.

An unmanned aircraft, powered by fuel cell, is an attractive and challenging application. The aircraft Hyfish is suited to demonstrate the performance of a FC-system in a challenging environment.

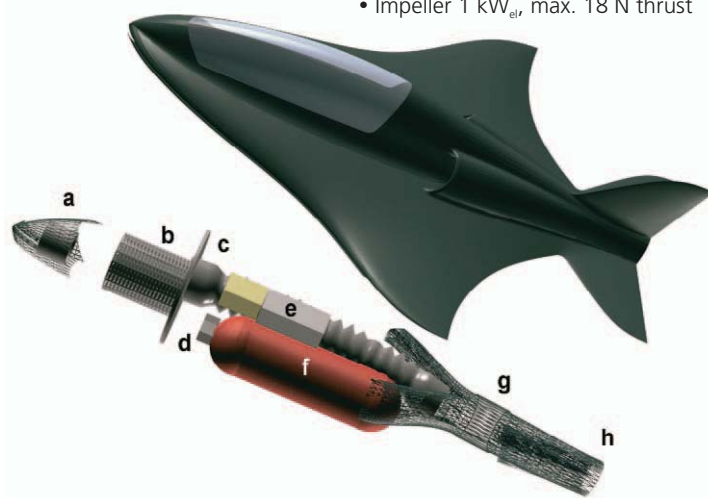
The FC-propulsion system consists of the following components.

Flying Model

The aircraft will be constructed based on the development by the Swiss company SmartFish GmbH, because the aircraft design combines usable volume and weight as well as excellent performance.

The specifications of the model are:

- length 1.3 m, wingspan 1 m
- total weight 5 kg
- max. air speed 200 km/h
- Impeller 1 kW_{el}, max. 18 N thrust



(a) fan for the cathode air supply and for the stack cooling; (b) FC stack; (c) air duct; (d) pressure reducer; (e) controller; (f) H₂ pressure tank; (g) impeller; (h) exhaust

Fuel Cell System

To obtain a flight performance comparable to a battery-powered aircraft the fuel cell system should have the following specifications:

- 3 kg/kW gravimetric power density
- vibration and shock resistance
- cross acceleration resistance
- -40°C +40°C environmental temperature
- 200-1.000 mbar. abs. environmental pressure

Project Objectives

In mid-March 2007 a successful first flight of HyFish has been carried out. In addition to an unmanned aircraft, other applications with high power density requirements are of interest. Therefore, after the system was demonstrated successfully in HyFish, the system will be optimised concerning reliability, long term stability and cost reduction.

Project Partners

- **Team SmartFish**
aircraft
www.smartfish.ch
- **DruKon**
pressure reducer
www.drukon.de
- **Luxfer, BaltiCo**
H₂ pressure tank
www.luxfer.com
www.air-composite.com
- **Horizon**
FC-stack
www.horizonfuelcell.com
- **Technikzentrum Ainet**
mold making
www.tz-ainet.at
- **LTB-Borowski**
aircraft manufacturing
www.ltb-borowski.de