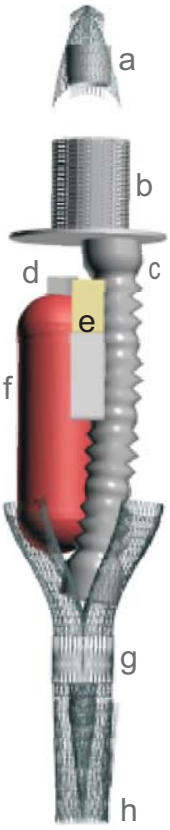
Deutsches Zentrum
für Luft- und Raumfahrt e.V.
in der Helmholtz-Gemeinschaft

HyFish
Flying Fuel Cell Demonstrator

1

2



Project Description

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

An unmanned aircraft, powered by fuel cell, is an attractive 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, shown in Figure 2

(a) fan for the cathode air supply andfor the stack cooling

(b) FC stack

(a) air duct

(d) pressure reducer

(e) controller

(f) H2 pressure tank

(g) impeller

(h) exhaust

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

Figure 1: Aircraft with FC-system
Figure 2: FC-system

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 addition to an unmanned aircraft, other applications with highpower 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

BaltiCo ▸ H2 pressure tank
www.air-composite.com

Horizon ▸ FC-stack
www.horizonfuelcell.com

Technikzentrum Ainet ▸ mold making
www.tz-ainet.at

Deutsches Zentrum
für Luft- und Raumfahrt e.V.
German Aerospace Center

Institute of Technical Thermodynamics
Pfaffenwaldring 38-40
D-70569 Stuttgart

Inquiries:
Prof. Dr. K. Andreas Friedrich

Phone: +49(0) 711/6862-278
Fax: +49(0) 711/6862-1278
E-mail: andreas.friedrich@dlr.de
Internet: http://www.dlr.de/tt