insight

Implementatio**N** in real SOFC **S**ystems of mon**I**toring and dia-**G**nostic tools using signal analysis to increase t**H**eir life**T**ime.

Objectives

-10%/kWh
Total Cost Ownership

+5%
Stacks lifetime

+1%
Availability

INSIGHT

enhanced the quality of SOFC stack diagnostic tools and provided the opportunity to embed them on real systems.

INSIGHT

developed the device and the know-how for the implementation of monitoring and diagnostics advanced solutions available so far in laboratory only.

The main results are:

Know-how to develop customised monitoring and diagnostic solutions

- Selection of the most critical faults to be considered by ranking severity and probability of occurrence: fuel starvation, Carbon deposition and gas leakage
- Advice and expertise on developing monitoring and analysis techniques: PRBS* and sinewave EIS*, THD* index in addition to conventional signals

Tools and Algorithms for detection of the state of health of SOFC stacks and systems

- Fault detection and isolation thanks to a signature matrix defined for each fault studied
- Suggestion of mitigation actions at early stage at stack level to extend its lifetime
- Avoidance of system shut-down and improvement of maintenance process (predictive maintenance)
- Increase of lifetime and efficiency of stack and system
- Reduce total cost of ownership and in particular OPEX, including service and stack replacement

Bitron Box: Electronic device for Solid Oxide Fuel Cell (SOFC) Systems online Monitoring and Diagnosis

- Embed monitoring and diagnostics tools developed in INSIGHT project
- Allows fault detection by means of EIS* (sinewave and PRBS*) and T HD* characterization
- Guarantees real time outcomes in terms of fault isolation
- Best trade-off between quality of the analysis and cost of the solution
- Excellent interfacing and synchronization
- Customer-oriented solution

Small size high efficiency SOFC micro-cogeneration, system

- Modifications of power electronics and control software to allow monitoring and diagnostic tools to be embedded
- Bitron Box successfully integrated into a commercial EnGen 2500 µCHP from Solidpower
- In-field test
- Increased maintenance service intervals
- Switch to predictive maintenance strategy

*PRBS : pseudo-random binary signal / *EIS : electrochemical impedance spectroscopy / *THD : total harmonic distortion

Contact us if you want to be the first to be informed about latest results of the project.

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