

Hydrogen Storage Systems for Automotive Application

Objectives

- Identify the **most promising hydrogen storage** solutions for different automotive applications.
- Introduce **innovative and competitive solutions for high pressure, cryogenic and solid hydrogen storage** as soon as possible by means of R&D efforts, demonstration activities as well as development of appropriate production technologies.

Project Plan

StorHy is divided into 6 Subprojects (SPs):

the 3 vertical Subprojects, **SP Pressure Vessel**, **SP Cryogenic Storage** and **SP Solid Storage**, concentrate on addressing the technological development of innovative H₂ storage solutions. Cutting across these vertical SPs, the horizontal activities include the **SP Users** (defining requirements and disseminating results), the **SP Safety Aspects & Requirements** (carrying out safety studies and pre-normative research) and the **SP Evaluation** (responsible for multi-criteria evaluation of the results).

Status / Achievements

Pressure Vessels



- Advanced manufacturing technology with ring winding head and modular siphon impregnation units as well as advanced path generation: *winner of 2 Innovation Awards (AVK, JEC)!*
- Prototypes of 700 bar Type III tanks: burst behaviour satisfactory, cycling behaviour to be improved
- Prototypes of 700 bar Type IV tanks: cycling behaviour satisfactory, burst behaviour close to target
- Prototype of 300 bar thermoplastic modular system
- Prototype exchangeable rack system under development
- 700 bar cold / warm fast and safe filling demonstrated
- Fluidised bed recycling technology with high recovery rate
- Technology limitations and further R&D needs identified

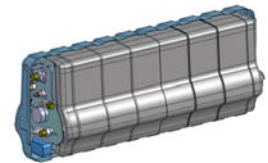
Multicriteria Evaluation

- Evaluation and comparison of the technical performance of the H₂ storage solutions at system and vehicle level
- Life Cycle Analysis, identification of the main cost drivers for each H₂ storage technology, social acceptance study

StorHy Train-In, 25-29 Sept., 2006

- One week full-time training course on hydrogen storage at the University of Applied Sciences Ingolstadt, DE
- Over 80 participants from 20 countries
- All lecture handouts and results online on www.storhy.net

Cryogenic Storage



- Development of lightweight free-form cryogenic tank
- Cylindrical inner tank made from CFRP with metal coating manufactured
- 3D model of lightweight free-form tank with auxiliary systems
- Failure Tree Analysis and FMEA of tank structure and key components carried out

Solid Storage



- Up-scaling concept: Lab-scale tank with 500g NaAlH₄ built, larger bread board pilot tank with 5 kg material designed
- Continued screening among mixed alanates for material that fulfils automotive requirements: no breakthrough yet
- Chemical safety tests with doped aluminium hydride powders

Safety Aspects

- Assessment of test procedures for C-H₂ vessels
- Introduction of "Probabilistic Approach" for future Regulations, Codes and Standards to evaluate failure probability of whole system

Organisational Information

Budget	18,7 m €	Funding	10,7 m €
Duration	54 months	Start	March 2004
DG	Research	Priority Area	Priority 6: <i>Sustainable development, global change and ecosystems</i>
Coordinator	Dr. Volker Strubel, MAGNA STEYR	Contact	volker.strubel@magnasteyr.com
Partners	5 OEMs (DaimlerChrysler, BMW, Ford, Volvo, PSA), 14 suppliers, 15 research institutes		
Website	www.storhy.net		