BMW Group Research and Technology ZT-2 09.03.06

# New HySafe Project Proposal. Approval of StorHy Cryo Tanks.



## Claus Schitter ZT-2

**BMW Group Research and Technology** 



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## **Project LH<sub>2</sub> Light Weight Tank.**

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Thermal shock

Recycling





### State of the Art

- Stainless steel
- Cylindrical vessels
- Plant specific design



- **Future Challenges**
- Light weight materials
- Free form geometry
- Automotive design
- Reduced heat entry

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### Goals for Light Weight Tank. Tank mass / energy density.



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# LH<sub>2</sub> Free Form Tank. Project partner SP Cryo.

- **Objective:** Design of a car structure adapted Liquid <u>Hy</u>drogen <u>Ligh</u>tweight <u>T</u>ank System
  - Energy density (mass) similar to gasoline fuel tank

Project Duration:03/2004 - 09/2007Total Project Budget:6,81 Mio €EU+CH Funding:3,88 Mio €



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### Subproject Cryogenic Storage. Milestones.



Start ofDesign &Proof of Feasibility"Free form" TankProjectRequirements3 Cylindrical TanksVirtual model

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## Inner Tank. Specification.

#### Mechanical

- inner pressure 8 bar
- burst pressure 32 bar
- Crash ± 20 g in direction of travel
- Crash ± 8 g across direction of travel

### Temperature

- -253 ℃ to +120 ℃ (curing)
- RT LH<sub>2</sub> / Thermal shock

### Vacuum stability

- no H<sub>2</sub> permeation no micro cracks
- no outgassing

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# StorHy Light Weight Tank. Safety Issues.



Thermography LH<sub>2</sub> Tank



**Burst Test** 



Crash





Thermal Load



**Roll-Over** 



Damage of insulation vacuum



Mechanical damage

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# StorHy Light Weight Tank. HySafe Project Proposal.

#### Close cooperation on cross cutting issue

- StorHy approves its storage system
- HySafe states its lead in H<sub>2</sub> safety competence
- Common partners assure good communication
- Ease of accessibility to test samples





### =>Real world test of integration of research facilities and scientific cooperation.

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# StorHy Light Weight Tank. HySafe Project Proposal.

### **Objectives**

- Approval of StorHy tank components and systems
- Guideline for adaptation of EIHP regulation
- HySafe assumes lead in safety related issues
- Further integration between EC-projects





### **Project Tasks**

- Survey on current regulations for FRP LH2 storage systems
- Plan test program, allocate testing facilities, acquire test samples
- Perform and analyze tests
- Deduct further road map from deviation to current standards

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