

STORHY FINAL EVENT

HYDROGEN STORAGE SYSTEMS FOR AUTOMOTIVE APPLICATION

PSA POISSY, JUNE 3-4, 2008



Subproject Cryogenic Storage: Outer Jacket and Inner Tank

Objectives

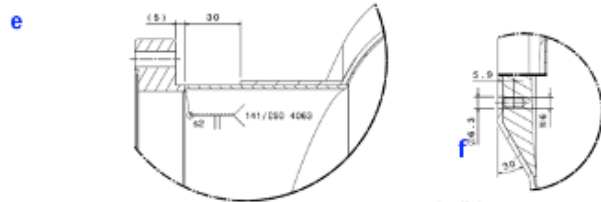
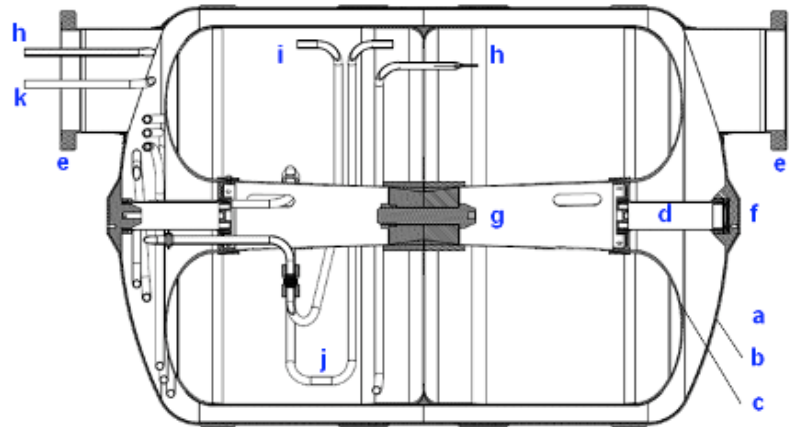
- ❖ The liquid hydrogen light weight tank system will combine the designs and manufacturing technologies of the cylindrical light weight composite material (carbon fibre reinforced plastic - CFRP) outer jacket and inner tank.

Description

Tank parameters:

- ❖ Mass \approx 41.5 kg
- ❖ Length 1 = 1050 mm (incl. flange)
- ❖ Length 2 = 922 mm (vessel only)
- ❖ Diameter = 610 mm
- ❖ Number of parts = 6 (excl. pipes)
- ❖ Materials:
 - Inner tank made of CFRP with copper liner (inside & outside)
 - Outer jacket made of CFRP with structural aluminium liner inside,
 - Inner tank supports are made of glass fibre reinforced plastic (GFRP)
 - Inserts made of stainless steel
 - Pipes made of stainless steel

The outer jacket is shown as an exhibit - the figure below shows the inner tank integrated into the outer jacket.



Main specifications:

- ❖ Energy density:
 - o Gravimetric = $>$ 8 kWh/kg
 - o Volumetric = $>$ 1.6 kWh/l
- ❖ Stored hydrogen mass = 10 kg at 6 bar
- ❖ Hydrogen storage capacity (mass fraction) = $>$ 12 wt%
- ❖ Operating temperature = -253 to +85 °C
- ❖ Operating pressure = 0 to 6 bar
- ❖ Re-fuelling time = 3 min (cold)
- ❖ Life cycle (cold - cold) = 15,000 filling / release cycles
- ❖ Filling cycles (warm - cold) = $>$ 50

List of parts:

- a = high vacuum
- b = light weight outer jacket
- c = light weight inner tank
- d = light weight inner tank support
- e = CF 160 vacuum flange
- f = fixing liquid hydrogen tank system
- g = tension tube with cones & bolt
- h = filling and take-off pipe liquid H₂
- i = electric pipe
- j = take-off pipe gaseous hydrogen
- k = safety pipe / boil-off pipe

Future Perspectives

- ❖ Modify and upgrade assembly process to speed-up production time and ensure a higher product quality for future volume production.

Partners	❖ Air Liquide		
	❖ Austrian Aerospace GmbH		
	❖ BMW Forschung und Technik GmbH		
	❖ Institut für Verbundwerkstoffe GmbH		
	❖ Linde AG		
	❖ MAGNA STEYR Fahrzeugtechnik AG & Co KG		
	❖ MT Aerospace AG		
	❖ Oerlikon Space AG		
❖ Prochain e.V.			
❖ Volvo Technology Corporation			

Website www.storhy.net



The project partners wish to thank the European Commission for financial support of the Integrated Project StorHy- Hydrogen Storage Systems for Automotive Application (Contract No.: SES6-CT-2004-502667) within the 6th RTD Framework Programme.