

Manufacturing of Type IV Tanks

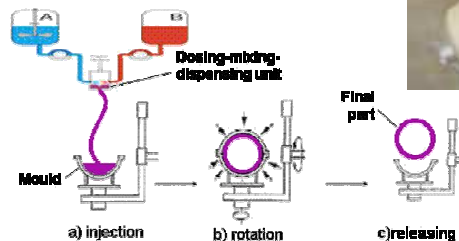
Objectives

- ❖ Demonstrate potential and safety of polymer liner based full composite tanks for light weight compressed gas vessels at 700 bar
- ❖ Assess materials, processes and industrial advantages and limitations
- ❖ Identify the most promising improvement axis

Achievements

- ❖ Formulation of a dedicated nylon based polymer for enhanced hydrogen tightness and thermomechanical behaviour
- ❖ Development of an innovative cost-effective industrial-friendly liner manufacturing process, Reactive Rotomoulding, directly from polymer monomers: one step process including polymer synthesis, moulding and boss insertion
- ❖ 96 thermoplastic liners manufactured with integrated bosses




Reactive Rotational Moulding



- ❖ 6 full composite tanks tested at Wroclaw University of Technology:
 - Burst pressure >1,645 bar (safety ratio >2.35)
 - Superior cycling resistance demonstrated: >15,000 cycles (standard)
 - Materials not sensitive to fatigue, no damage identified after 15,000 cycles
- ❖ 1 full composite tank tested at Air Liquide facilities:
 - Room temperature fast filling compatibility demonstrated
 - Very low H₂ leakage rates 20 times below the standard (0.05 cm³/L/h)
- ❖ Enhanced gravimetric storage density 5.4 wt.% (34L-tank)
- ❖ Costs: 13\$ / kWh

Future Perspectives

- ❖ Smart composite cylinder development featuring embedded sensors, improved or intrinsic safety
- ❖ Development of fully instrumented testing (ultrafast cameras, stress / strain / displacement sensors, optical fibre based sensors, radiography or tomography)
- ❖ Influence of manufacturing processes on short term / long term performance and scattering of properties
- ❖ Assessment, understanding and prediction of durability of materials, structures and joints

Partners	❖ Air Liquide	❖ CEA (with subcontractor Ullit)	❖ WUT (Wroclaw University of Technology)
			

Website www.storhy.net



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