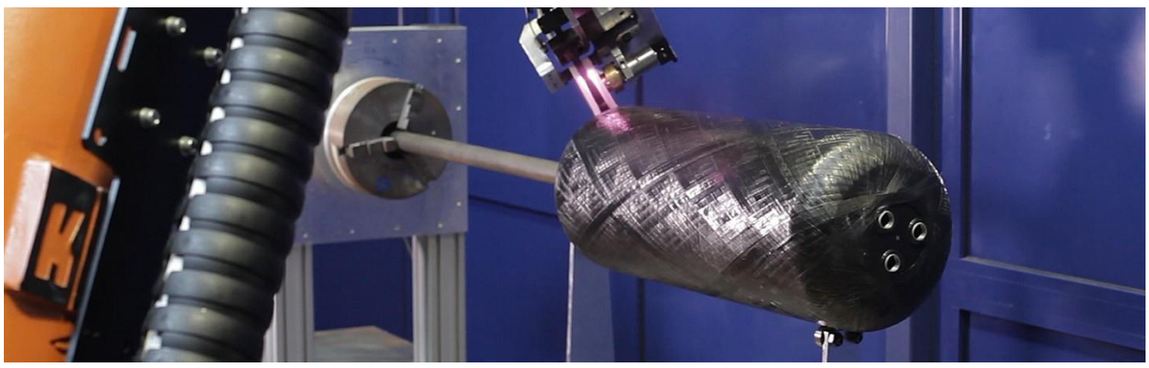
Hydrogen Pressure Vessels made from Fiber-Reinforced Plastics

Lightweight pressure vessels are used to store gaseous hydrogen in the energy sector or in the automotive industry. The Fraunhofer IPT automates systems and processes for processing glass and carbon fiber reinforced plastics using laser-assisted tape winding. Due to their mechanical properties, these materials are particularly suitable for the production of lightweight, stable and corrosion-resistant components. For production, the Fraunhofer IPT relies on digital methods for the acquisition and utilization of production data as well as virtual process modeling for large-scale production.



At Fraunhofer IPT we have developed systems for the automated production of rotationally symmetrical components such as hydrogen pressure tanks. In addition to conventional processes, an in-situ consolidation of thermoplastic tapes allows the production of pressure tanks with alternative matrix materials. In this way, tanks with different winding geometries can be manufactured. In addition, there is no need for subsequent curing. With this production process, pressure tanks can be manufactured for different industries and applications: from the storage of hydrogen as an energy carrier to compressed air storage for use in commercial vehicles.

Process Optimization and Prototype Production:

Depending on the application, we always design the process and system technology with the aim of increasing the process speed and production quality for high volumes. When manufacturing prototypes, we validate optimized process control by first documenting all data collected online, such as process temperature, contact force or feed rate. By linking the data to the position of the measuring point, we create a digital shadow of the component. This allows us to directly assign component defects to manufacturing irregularities, further improve our understanding of the process and optimize the processes in a targeted manner.

Our Services:

- Process development for series production and development of production-optimized tank designs
- Market studies and consulting on the use of hydrogen pressure tanks in the energy and automotive industries
- Feasibility studies and calculations on the economic viability of pressurized tanks for hydrogen storage
- Documented prototype production and product studies for load and certification tests, for example for OEM, Tier 1 and material manufacturers
- Development and construction of individual winding systems and production lines as well as modules for process monitoring and evaluation

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Kindly get in touch with us if you are interested in this technology or require further information.
Thanks and Regards,

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